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United States
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Agriculture

Forest Service

Alaska Region
R10-TP-16

Kenai Road Corridor Soil Survey

9/8/89



Girdwood

Turnagain Arm

Seward

AUG 27 1989

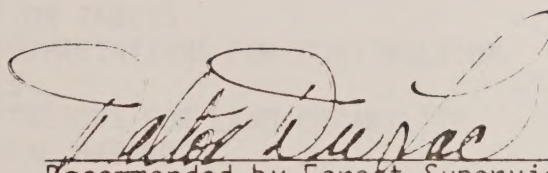
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SOIL SURVEY OF THE
ROAD CORRIDOR ON THE
KENAI PENINSULA
CHUGACH NATIONAL FOREST

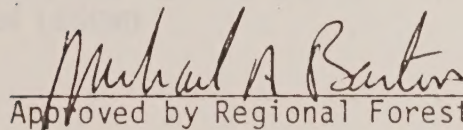
by

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Soil Scientist



Recommended by Forest Supervisor

5/8/89
Date



Approved by Regional Forester

5/11/89
Date

INTRODUCTION

Purpose

The primary purpose of this survey is to provide soils data and interpretations for land management planning. The information will be used for Management Area Analysis, projects, and environmental assessments as described by the Chugach Land and Resource Management Plan. This soil survey contains information for the major road corridors on the Kenai Peninsula on the land managed by the Chugach National Forest. It includes soils information for the valley bottoms up to the top of the spruce treeline or about midway up the valley sideslopes. This is an area of approximately one-half to three quarters of a mile on either side of each road. The "Soil Resource Inventory of the Kenai Peninsula" (USDA Report Number 110) provides supplementary information on the remaining portion of the Kenai Peninsula.

This survey is designed for use by foresters, engineers, planners, etc. Foresters may use this survey to identify the hazards or limitations that may be encountered with potential timber sales and access routes. Engineers may use the survey to identify the location of roads or structures, or potential limitations due to soil and topography that should be included in their designs and contracts. Planners can also use the survey as an initial data base to overlay other resources.

A Description of this Report

This soil survey report is divided into seven major parts: the Introduction, the Soil Taxonomy, the Map Unit Descriptions, the Soil Descriptions, the Maps, the Interpretations, and the Identification Legend which are found in the Appendices. At the beginning of the Map Unit Description section there is a summary table (Table 2) of map units and soil taxonomic components. This table is extremely useful for cross-referencing map units, soils, and the extent that a particular soil occurs within a map unit group.

The Map Unit Descriptions describe the physical characteristics of the terrain which has been delineated on the map. It includes information such as the position on the landscape, major vegetative types, slope range and character, climate and any contrasting soils that may be consistently included in the map unit. The Map Unit Description also includes an abbreviated description of the major soil profile(s) and some of the major soil properties. The Minor Soils section lists the taxonomic classification of the soil, the observed location of the soil, the vegetation most commonly associated with the soil, and the map unit number where there is more information for a particular soil. The Management Considerations section of each map unit (Appendix A) contains directions for the user in the following categories: roads, trails, campgrounds and picnic areas, and shallow excavations.

The Soil Description section (Appendix A) contains a physical description of the complete profile of each representative soil. This includes descriptions for each soil horizon and the range of soil properties.

The Maps contain the delineated map units on a photographic base at a scale of two inches to the mile. The location of each map related to the adjacent one can be found on the map index page which is located at the end of this report.

The Interpretations (Appendix B and C) consist of four tables which identify data and interpretations expressed by the management and potential users as being important in their work. Each table has an explanation of its contents and how the interpretations are to be used.

The Identification Legend (Appendix E) lists all the individual map units described in the survey.

Use of this Survey

This survey may be used for general land management planning, management area analysis, and project planning. Specific data for individual soils or map units may be extracted directly from the tables. More generalized objectives can be met by grouping map units or soils that have similar properties or characteristics. These properties or characteristics can be found in the tables or the Map Unit Description sections of the report.

The interpretation tables in the appendices provide estimates of the soil capability to respond to the impacts of various management activities. Preliminary locations for roads, trails, and facilities can be determined by selecting soils with properties that are suitable for development. The interpretation tables identify problems or hazards that must be overcome before successful development may occur. Locations of materials suitable for different types of construction can also be identified through use of the tables and by use of the representative profile descriptions of the soils.

The data provided in the Map Unit Descriptions section is intended to give the land manager a general picture of the map unit, its landform character and vegetative cover, and an overview of some of the major properties that should be taken into account for any project. Statements are provided in the Management Considerations section to identify the problems that may be encountered and under what conditions they may be encountered for an intended activity.

Location

The soil survey area is the immediate road corridor on the Chugach National Forest in the northeastern one-third of the Kenai Peninsula. The Kenai Peninsula is located in south-central Alaska bounded by the Cook Inlet on the west side and Prince William Sound on the east side (Fig. 1). The boundary of the survey is a line which parallels the road and approximates the upper boundary of the tree line; an area of approximately 70,000 acres. Elevations range from sea level to about 2,000 feet.

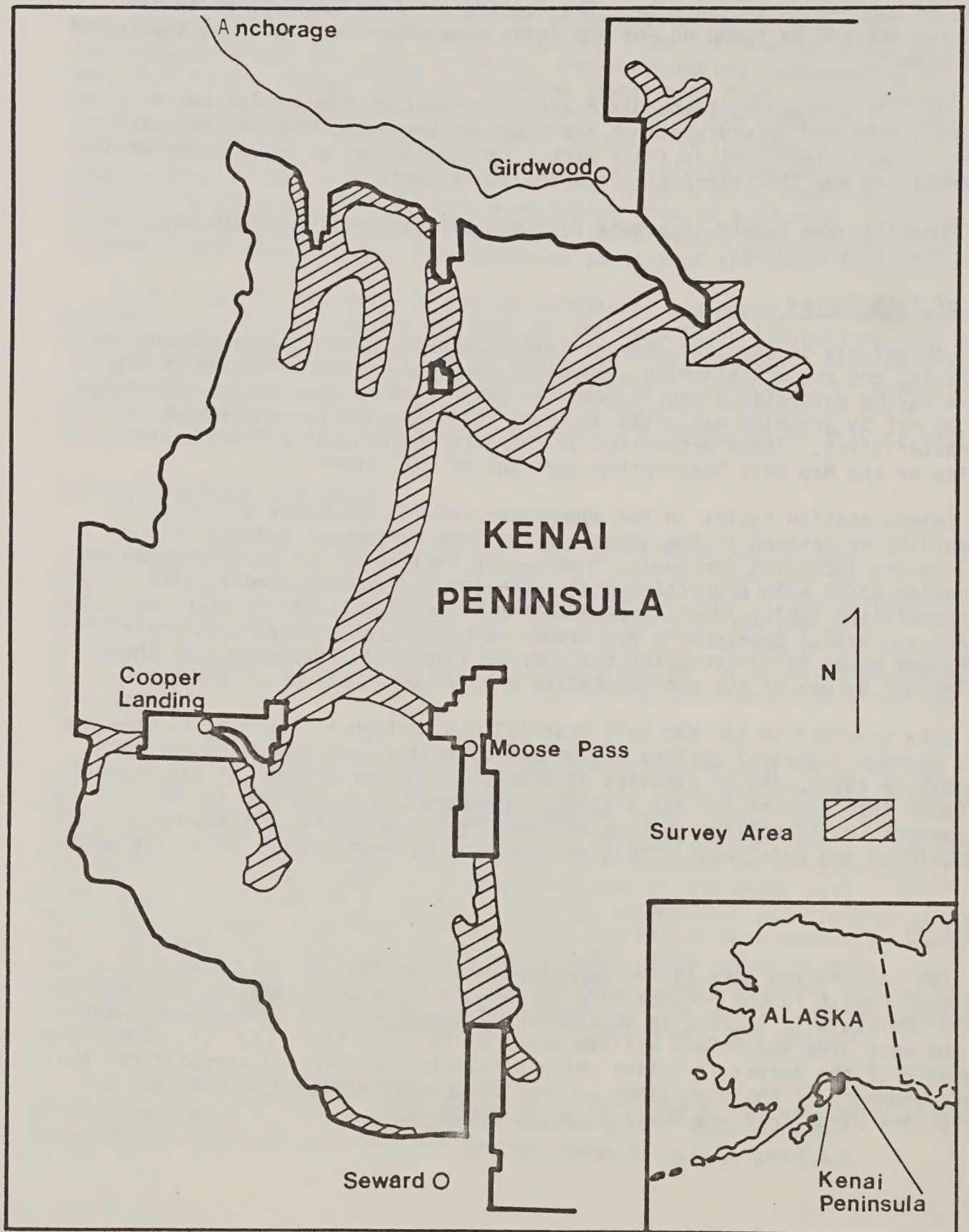


Figure 1. Index map showing the mapped area of the soil survey.

Climate

The climate on the Kenai Peninsula includes three major types: maritime; transitional; and continental. The coastal shoreline and mountains receive the greater amounts of precipitation which generally decreases toward the northwest corner of the Peninsula. Seward has a mean annual precipitation of 160 cm (63 in), Whittier about 444 cm (175 in), Moose Pass about 64 cm (25 in), and Cooper Landing with about 51 cm (20 in). The months of September and October generally have the heaviest amounts of precipitation, although the coastal areas receive high amounts throughout the year (2).

The air temperature, which is influenced strongly by the moderating effects of the ocean, is relatively cool in the summer and warm in the winter in comparison to the more inland areas. Seward has a mean annual July temperature of 13 C (55 F), whereas Anchorage has 15 C (58 F). Seward also has a mean annual January temperature of about -4 C (25 F) and Anchorage has about -11 C (12 F).

The portion of precipitation that falls as snow is dependent upon elevation and air temperature. Generally, greater amounts of snow accumulate with the colder temperatures at higher elevations. Heavier precipitation in the eastern and southern coastal mountains produces more than 1016 cm (400 in) of snow annually. The total snowfall decreases toward the northwest to about 178 cm (70 in) because of the shadow effect produced by the coastal mountains.

Vegetation

Most of the plant associations on the Kenai Peninsula are in one of four major positions: the alluvial valley bottoms; the lower depositional sideslopes; the upper sideslopes; and the mountain tops and ridges. The first three occur in this survey area. In those areas in the valley bottoms where the alluvial soils are well-drained there is generally a moss or grass ground cover; a willow, devil's club, alder understory; and a cottonwood, spruce overstory. Those alluvial valley soils with poor drainage are generally characterized by a moss and grass ground cover; a willow, blue berry, alder understory; and spruce overstory. The lower depositional sideslopes generally have a moss, low-bush cranberry, crowberry ground cover; blue berry, menziesia, alder understory; and a birch, white spruce, western hemlock overstory. The upper sideslopes are vegetated by grass, ferns, forbs, and alder. Mountain hemlock commonly occurs on some ridge areas.

Geology

The Kenai Peninsula bedrock is dominated by sedimentary rocks resulting from deposition of gravel, sand, silt, and clay sediments in a geosyncline early in the Cretaceous period. The rocks are basically of the Valdez group and consist of mostly siltstone and mudstone metamorphosed to slate. There is also feldspathic graywacke which varies in amounts and composition throughout the Peninsula.

Major uplifting in the late Cretaceous period formed mountains which were shaped and carved to their present state by Quaternary glaciers and erosion. The dominant surficial features are composed of coluvium and sediments left by the glaciers and streams. The valley sidewalls are commonly covered by glacial till which consists of unsorted boulders, cobbles, gravels, sand and silt. This material is usually loose, but may be compacted and hard in places. Much of the till in the lower valleys has been translocated by water to form flood plains and river terraces consisting of more stratified cobbles, gravels, sands and silts. There are also clay and/or silt rich lenses which were formed in lakes and lagoons where silt and clay size sediments settled out of the water. Where these finer sediments are located near the soil surface, usually they support muskegs or at least more hydric vegetation as contrasted to coarser deposits which support shrub and tree type vegetation. Landslides, alluvial fans and talus break up the continuity of the glacial deposits on the sideslopes.

Soils

The soils on the slopes have developed in glacial till and coluvium. There are also inclusions of shallow soils over bedrock and bedrock outcrops. Typically, the soils in the glacial till and coluvium are medium-textured with rocks and gravel. These soils are usually deeper than 40 inches. Sometimes a somewhat compacted, water-restricting layer will occur in the lower part. In some places there are also finer-textured soils that are poorly drained or saturated with high amounts of runoff from the slopes. Soils with a water restricting layer or are poorly drained can often be identified by the presence of more hydric surface vegetation.

The soils in the valley floors have developed mostly in depositional alluvium left by receding glaciers or by rivers and streams. Inclusions of bedrock are found in some locations. Soils that have developed in alluvial, outwash material are usually deeper than 40 inches, have a fine to coarse sandy matrix with well-sorted gravels and cobbles. Almost all of these soils are well or excessively drained. Some soils consist of fine-textured grains that were deposited in pools, protected areas along the edges of creeks, and flood deposits farther from the creeks. These soils impede water drainage and commonly form muskegs.

SOIL TAXONOMY

The soil taxonomy (Soil Conservation Service, 1975) is a hierarchical system with six levels or categories. From general to specific they are called Orders, Suborders, (Great) Groups, Subgroups, Families, and Series. Histisols, Entisols, Inceptisols, and Spodosols are the orders that represent the soils mapped in this survey.

The Entisol, Inceptisol, and Spodosol Orders contain mineral soils and the Histisol Order contain the organic soils. The Histisols are separated from the other orders by the amount of organic material that occurs at or near the surface. The mineral orders are separated by the type and degree of horizon development within the soil profile. Soil horizons are delineated by identifying features resulting from the movement and presence of chemicals within the soil profile, or the degree and type of physical structure.

The three mineral soil orders that have been identified on the Kenai Peninsula describe different levels of progressive development. Entisols are the least developed soils and have no distinguishing layers or horizons. Inceptisols have evidence of sufficient development so that some minimum horizon development can be identified or inferred. Spodosols usually have two or more horizons that show the translocation of organic matter and sesquioxides within the soil profile. The Histisols are organic soils that have more than 16 inches of organic material at or near the surface. Table 1 shows the different soils that have been described in this soil survey.

The taxonomic identification of nonorganic soils depends largely on the presence or absence of diagnostic horizons. On the Kenai Peninsula these are ochric, umbric, and histic epipedons (horizons that occur at the surface.) and cambic and spodic horizons. Ochric epipedons are surface horizons lacking the organic matter, the dark colors, or thickness to be umbric epipedons. Umbric epipedons are strongly leached, thick, dark-colored surface layers with more than one percent organic matter. Histic epipedons are thick surface layers with more than 12 percent organic carbon if the mineral fraction is sandy, or more than 18 percent organic carbon if the mineral fraction is fine clay. Cambic horizons are subsurface layers with some indication of soil development due to physical or chemical weathering or to the leaching or translocation of carbonate, iron, clay, or other constituents. Spodic horizons are well-developed subsurface horizons where iron, aluminum, or organic matter leached from surface horizons has accumulated.

Table 1. Taxonomic classes of the soils in the Kenai Road Corridor Soil Survey Area.

Order	Group	Subgroup	Family	Series, phase
Entisols				
	Cryaqueunts,	Typic	coarse-loamy over sandy-skeletal, mixed loamy-skeletal, mixed sandy-skeletal, mixed	
	Cryofluvents,	Typic	loamy-skeletal, mixed coarse-loamy over sandy, mixed	Niklason
	Cryorthents,	Typic	sandy-skeletal, mixed	Chenega, dry phase
Inceptisols				
	Cryaquepts,	Histic	coarse-silty, mixed loamy-skeletal, mixed	
	Cryochrepts,	Dystic	loamy-skeletal, mixed	
		Lithic	loamy-skeletal, mixed	
		Pergelic	loamy-skeletal, mixed	
	Cryumbrepts,	Typic	loamy-skeletal, mixed	
Spodisols				
	Cryorthods,	Typic	coarse-loamy, mixed loamy-skeletal, mixed medial-skeletal, mixed sandy-skeletal, mixed	Yakutat, dry phase
		Lithic	loamy-skeletal, mixed	
Histisols				
	Borosaprists,	Terric	loamy, mixed, euic	Clunie
	Borofibrists,	Terric	loamy, mixed,	Stave

Table 2. Map Unit Groups and their Soil Taxonomic Components

Map Unit Groups	Soil Name	Soil Symbol	Extent in Map Unit Group
101A-F	Typic Cryorthods, Loamy-skeletal, mixed	24	80%
	Lithic Cryorthods, Loamy-skeletal, mixed	48	10%
	Histic Cryaquepts, Loamy-skeletal, mixed	29	10%
102B-F	Lithic Cryorthods, Loamy-skeletal, mixed	48	70%
	Typic Cryorthods, Loamy-skeletal, mixed	24	30%
103A-F	Typic Cryorthods, Coarse-loamy, mixed	51	75%
	Lithic Cryorthods, Loamy-skeletal, mixed	48	10%
	Terric Borosaprists, Loamy-skeletal, mixed euic	36	15%
104D	Typic Cryorthods, Sandy-skeletal, mixed	15	95%*
105A-D	Typic Cryorthods, Sandy-skeletal, mixed	14	70%
	Typic Cryorthods, Loamy-skeletal, mixed	24	30%
201E-F	Lithic Cryochrepts, Loamy-skeletal, mixed	25	70%
	Dystric Cryochrepts, Loamy-skeletal, mixed	63	30%
202A-F	Dystric Cryochrepts, Loamy-skeletal, mixed	34	85%
	Histic Cryaquepts, Loamy-skeletal, mixed	29	15%
204A-C	Histic Cryaquepts, Loamy-skeletal, mixed	29	60%
	Histic Cryaquepts, Coarse-silty, mixed	61	30%
	Terric Borosaprists, Loamy-skeletal, mixed euic	36	10%
205C-F	Dystric Cryochrepts, Loamy-skeletal, mixed	63	50%
	Typic Cryorthods, Loamy-skeletal, mixed	24	30%
	Histic Cryaquepts, Coarse-silty, mixed	29	20%
206D-F	Dystric Cryochrepts, Loamy-skeletal, mixed	63	70%
	Typic Cryaquents, Loamy-skeletal, mixed, nonacid	64	30%
207A-D	Typic Cryumbrepts, Loamy-skeletal, mixed	20	85%
	Typic Cryaquents, Coarse-loamy over sandy-skeletal, mixed	50	15%
208A-F	Dystric Cryochrepts, Loamy-skeletal, mixed	63	85%
	Histic Cryaquepts, Loamy-skeletal, mixed	29	15%
211B-C	Pergelic Cryochrepts, Loamy-skeletal, mixed	62	90%
	Histic Cryaquepts, Coarse-silty, mixed	61	10%
301A-B	Typic Cryaquents, Sandy-skeletal, mixed	16	90%
	Typic Cryofluvents, Loamy-skeletal, mixed nonacid	7	10%

Map Unit Groups	Soil Name	Soil Symbol	Extent in Map Unit Group
302A-C	Typic Cryorthents, Sandy-skeletal, mixed	19	85%
	Typic Cryaquents, Sandy-skeletal, mixed	16	15%
303A-B	Typic Cryaquents, Coarse-loamy over sandy-skeletal, mixed	50	95%*
304A-B	Typic Cryofluvents, Loamy-skeletal, mixed, nonacid	7	85%
	Typic Cryaquents, sandy-skeletal, mixed	16	15%
305	Talus from placer mining M.U. #304		85%
	Typic Cryofluvents, Loamy-skeletal, mixed nonacid	7	15%
306C-E	Typic Cryaquents, Loamy-skeletal, mixed, nonacid	64	85%
	Dystic Cryocherts, Loamy-skeletal, mixed	34	15%
401A-B	Terric Borosaprists, Loamy-skeletal, euic	36	90%
	Hystic Cryaquepts, Coarse-silty, mixed	29	10%
402A	Tidal Flats		100%
GP	Gravel Pits		100%
Ch	Chena very gravelly sand, 0-3% slopes	Ch	95%*
Cl	Clunie peat, 0-3% slopes	Cl	95%*
Cn	Cryaquents, Loamy, 0-3% slopes	Cn	75%
	Clunie Peat	Cl	15%
	Stave soils	St	10%
Gr	Gr peat, 0-3% slopes	Gr	85%
	Clunie soils	Cl	15%
Nk	Niklason sandy loam, 0-3% slopes	Nk	85%
	Chena soils	Ch	15%
St	Stave fine sandy loam, 0-3% slopes	St	85%
	Cryaquents		15%

* Sums that equal less than 100% are due to inclusions.

MAP UNIT DESCRIPTION

Map Unit Group: 101

This group consists of six Map Units: 101A, 101B, 101C, 101D, 101E, and 101F.

Map Unit Composition:

Major Soil

Soil Name:	Typic Cryorthods, medial-skeletal, mixed and similar soils (80%)
Vegetative Community:	Birch, spruce, hemlock, rusty menziesia, alder and devil's club
Position on Landscape:	Soils on mountain sideslopes and footslopes over glacial till
Sample Profile (Soil Number 24):	
10-0cm (4-0 in.)	Moss, sticks, and needles over decomposed organic material,
0-2 cm (0-1 in.)	Dark brown, fine sandy loam, Est. Unified Classi: ML
2-7 cm (1-3 in.)	Dark gray, fine sandy loam, 5% gravel, EUC: ML
7-26 cm (3-10 in.)	Dark reddish brown, fine sandy loam, 15% gravel, EUC: ML
26-75 cm (10-30 in.)	Very dark grayish brown, sandy loam, 60% gravel and cobbles, EUC: GM
Depth Class:	Deep (greater than 100 cm)
Drainage Class:	Well drained
Wetness Class:	1a, not wet above 150 cm for more than 1/12 of the time.
Permeability:	Moderate (surface layers); Moderate to slow (glacial till)

Minor Soil

Soil Name:	Lithic Cryorthods, loamy-skeletal, mixed (10%), (M.U. 102)
Position on Landscape:	Upper sideslopes and near rock outcrops
Vegetative Community:	Bluejoint reedgrass vegetation.

Minor Soil

Soil Name:	Histic Cryaquepts, loamy-skeletal, mixed (10%), (M.U. 204)
Position on Landscape:	Toe slopes
Vegetative Community:	Spruce, hemlock, devil's club, horsetail, and feather moss

Slope Character: Concave to straight

Elevation: 0-1000 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Air Temperature: 28-34 F

Map Unit Group: 101--Continued

Slope Range:	101A	0 - 8%
	101B	9 - 15%
	101C	16 - 25%
	101D	26 - 45%
	101E	46 - 65%
	101F	66 - 100%

Management Considerations:

Roads

1. The soils in this map unit found on slopes less than 45% are normally suitable for low use roads such as skid trails and mining roads that are constructed out of the in-place soils.
2. The soils in this map unit will be more susceptible to mass wasting on slopes over 45% where they occur over an impermeable compact till, or on minor soils that are wet.
3. Common avalanche occurrences will restrict winter use.
4. Steep or long yarding paths, skid trails, 4-wheel drive roads, etc., are subject to erosion unless protected by adequate water bars or plant cover.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Trail construction on slopes over 45% will require extensive excavation during construction.
3. Parts of this map unit are located where there is an avalanche hazard which will restrict winter use.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or R.V. parking.
2. Much of this map unit is located in areas with an avalanche hazard which will restrict location of facilities and winter use.

Shallow Excavations

1. Excavations will become more limited and costly in areas with steeper slopes.

MAP UNIT DESCRIPTION

Map Unit Group: 102

This group consists of five Map Units: 102B, 102C, 102D, 102E, and 102F.

Map Unit Composition:

Major Soil

Soil Name:	Lithic Cryorthods, loamy-skeletal, mixed (70%)
Vegetation Community:	Hemlock, rusty menziesia, blueberry, and feather moss
Position on Landscape:	Mountain sideslopes, and ridge crests near bedrock outcrops
Sample Profile (Soil Number 48):	
5-0 cm (2-0 in.)	Moss and leaves
0-5 cm (0-2 in.)	Dark brown, silt loam, Est. Unified Classi: ML
5-8 cm (2-3 in.)	Light gray, silt loam, 5% gravel; EUC: ML
8-40 cm (3-16 in.)	Dark reddish brown, loam, 45% gravel & cobble: EUC: ML
40 cm (16 in.)	Graywacke or meta sandstone bedrock
Depth Class:	Shallow
Drainage Class:	Well drained
Wetness Class:	4a, wet above 50 cm less than 1/12 of the time
Permeability:	Moderate to bedrock, very slow along bedrock

Minor Soil

Soil Name:	Typic Cryorthods, Loamy-skeletal, mixed (30%)
Vegetative Community:	Hemlock, spruce, rusty menziesia, blueberry, and feather moss
Position on Landscape:	Mountain sideslopes and footslopes
Sample Profile (Soil Number 24):	
10-0cm (4-0 in.)	Moss, sticks, and needles over decomposed organic material
0-2cm (0-1 in.)	Dark brown, fine sandy loam, Est. Unified Classi: ML
2-7cm (1-3 in.)	Dark gray, fine sandy loam, 5% gravel, EUC: ML
7-26cm (3-10 in.)	Dark reddish brown, fine sandy loam, 15% gravel, EUC: LM
26-75cm (10-30 in.)	Very dark grayish brown, sandy loam, 60% gravel and cobbles, EUC: GM
Depth Class:	Deep (greater than 100 cm)
Drainage Class:	Well drained
Wetness Class:	1a, not wet above 150 cm for more than 1/12 of the time.
Permeability:	Moderate (surface layers); Moderate to slow (glacial till)

Map Unit Group: 102--Continued

Slope Character:	Convex and/or irregular
Elevation:	500-1500 feet
Climatic Data (average annual):	Precipitation: 30-50 in.; Air Temperature: 26-32 F
Slope Range:	102B 9 - 15% 102C 16 - 25% 102D 26 - 45% 102E 46 - 65% 102F 66 - 100%

Management Considerations:

Entire Map Unit

Roads

1. Steep or long yarding paths, skid trails, 4-wheel drive roads, etc., are subject to erosion unless protected by adequate water bars or plant cover.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Trail construction on slopes over 45% will require extensive excavation during construction.
3. Much of this map unit is located where there is an avalanche hazard which will restrict winter use.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.
2. Much of this map unit is located in areas with an avalanche hazard which will restrict facility location and winter use.

Shallow excavations

1. Excavations will become more limited and costly with steeper slopes.

Lithic Cryorthods, Loamy-Skeletal, Mixed

Roads

1. Shale, slate or meta sandstone bedrock will be encountered near the surface of this soil.
2. Road excavation will encounter increasingly more bedrock on steeper slopes.
3. Road cuts which expose soil over bedrock on sideslopes over 65% will decrease the slope stability, especially when the soil is saturated.

Map Unit Group: 102--Continued

4. These soils are highly susceptible to compaction and should either be skidded on when the surface is frozen or the skid trails monitored so the organic layer is not totally removed.

Trails

1. Construction for trails will encounter a considerable amount of slate, shale or meta sandstone bedrock near the soil surface.

Campgrounds and Picnic Areas

1. Excavation for level areas for tent pads, table sites and vehicle or recreational vehicle parking will be hindered by the presence of slate, shale or meta-sandstone bedrock at or near the surface.

Shallow Excavations

1. Shale, slate or meta sandstone bedrock near the soil surface will make excavations more difficult and costly.

Typic Cryorthods, Loamy-Skeletal, Mixed

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads that are constructed out of in-place soils.
2. The soils in this map unit may be susceptible to mass wasting on slopes over 45% where they occur over impermeable compact till.
3. Common avalanche occurrences will restrict winter use.

MAP UNIT DESCRIPTION

Map Unit Group: 103

This group consists of six Map Units: 103A, 103B, 103C, 103D, 103E, and 103F.

Map Unit Composition:

Major Soil

Soil Name: Typic Cryorthods, coarse loamy, mixed and similar soils (75%)
Vegetative Community: Birch, spruce, hemlock, rusty menziesia, and club moss
Position on Landscape: Soils on terraces or old valley bottoms over alluvium
Sample Profile (Soil Number 51):
9-0 cm (4-0 in.) Moss, leaves and twigs
0-1 cm (0-.5 in.) Brown, silt loam, EUC: ML
1-11 cm (.5-4 in.) Dark brown, silt loam, EUC: ML
11-24 cm (4-10 in.) Dark yellowish brown, silt loam, EUC: ML
24-40 cm (10-16 in.) Light olive brown, silty clay loam, 15% gravel, EUC: ML
40-75 cm (16-30 in.) Brown, silty clay loam; 20% gravel, EUC: ML
Depth Class: Deep (greater than 100 cm)
Drainage Class: Moderately well drained
Wetness Class: 3b, wet between 50 and 100 cm about 1/12 to 1/4 of the time.
Permeability: Slow

Minor Soil

Soil Name: Lithic Cryorthods, loamy-skeletal, mixed (10%), (M.U.102):
Vegetative Community: Bluejoint grass
Position on Landscape: Crests of small hills and cliff bands

Minor Soil

Soil Name: Terric Borosaprists, loamy-skeletal, mixed (15%), (M.U.401):
Vegetative Community: Bluejoint grass, moss, wood fern, alder, spruce
Position on Landscape: Small basins in between hills

Slope Character: Concave to straight

Elevation: 200-700 feet

Climatic Data (average annual): Precipitation: 10-30 in.; Air Temperature: 30-34 F

Map Unit Group : 103--Continued

Slope Range:	103A	0 - 8%
	103B	9 - 15%
	103C	16 - 25%
	103D	26 - 45%
	103E	46 - 65%
	103F	66 - 100%

Management Considerations:

Roads

1. The soils in this map unit have too fine a texture to be normally suitable for low use roads made out of in-place material and will present extensive excavation, drainage, and erosion problems.
2. The high silt and clay content of the soils in this map unit will not provide a road surface suitable for traffic.
3. All road construction should be done after the soils have drained from spring snow melt and are no longer saturated.
4. The soils in this map unit are highly susceptible to compaction and should either be skidded on when the surface is frozen or the skid trails monitored so the organic layer is not totally removed.
5. The soils in this map unit are highly susceptible to mass wasting on slopes of increasing steepness starting at 25%, and construction activities requiring excavation will accelerate or stimulate this hazard.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. The fine texture of the soil in this map unit will present extensive excavation, drainage and trail surface strength problems while it is wet and until it is compacted sufficiently to shed water.
3. Long or steep sections of trail are subject to erosion unless protected by adequate drainage or vegetation cover.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation of overlay material to produce level areas with suitable drainage for tables, tent pads and vehicle or R.V. parking.
2. The slow percolation rate of the fine textured top soil will cause ponding of water during wet periods.
3. The fine textured top soil will compact easily from people use and restrict plant growth and establishment.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.
2. Excavation should be done when the soil has drained from spring snowmelt and is no longer saturated.

MAP UNIT DESCRIPTION

Map Unit: 104A

Map Unit Composition:

Major Soil

Soil Name:	Typic Cryorthods, sandy-skeletal, mixed and similar soils (95%)
Vegetative Community:	Bluejoint grass, alder and moss or lowbush cranberry, blueberry and mountain hemlock in alpine areas
Position on Landscape:	Glacial kame field in Palmer Creek Valley
Sample Profile (Soil Number 15):	
11-0 cm (4-0 in.)	Grass, alder, leaves, and moss over partially decomposed organic material
0-6 cm (0-2.5 in.)	Brown, very fine, sandy loam, 25% gravel and cobbles, EUC: ML
6-25 cm (2.5-20 in.)	Reddish brown, sandy loam, 85% gravel and cobbles, EUC: GM
52-180 cm (20-47 in.)	Dark brown, loamy sand, 90% gravel and cobbles, EUC: GP
Depth Class:	Deep(greater than 100 cm)
Drainage Class:	Well drained.
Wetness Class:	1a, not wet above 150cm for more than 1/12 of the time
Permeability:	Moderate (Surface layers); Rapid (Subsoil)

Slope Character: Concave to convex on short slopes

Elevation: 1700-2000 feet

Climate Data (average annual): Precipitation: 40-50 in.; Air Temperature: 28-30 F

Slope range: 25-45%

Management Considerations:

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads that are constructed out of in place soil.
2. Most of this map unit is located where there is an avalanche hazard which will restrict winter use.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Trail construction on slopes over 45% will require extensive excavation during construction.
3. Common avalanche occurrences will restrict winter use.

Map Unit: 104A--Continued

4. The soils in this map unit have a high percentage of cobbles larger than 3 inches in diameter.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicles parking.
2. Common avalanche occurrences will restrict facility location and winter use.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.
2. Excavation will be hampered by large cobbles and stones.

MAP UNIT DESCRIPTION

Map Unit Group: 105

This group consists of four Map Units: 105A, 105B, 105C, and 105D.

Map Unit Composition:

Major Soil

Soil Name: Typic Cryorthods, sandy-skeletal, mixed (70%)
Vegetative Community: Sitka spruce, birch, crowberry, low bush cranberry, moss
Position on Landscape: Alluvial terraces and cut slopes
Sample Profile (Soil Number 14):
5-0 cm (2-0 in.) Moss, leaves and roots
0-6 cm (0-2.5 in.) Very dark grayish brown, loam, EUC: ML
6-12 cm (2.5-5 in.) Weak red, silt loam, 15% gravel, EUC: ML
12-34 cm (5-13 in.) Dark brown, sandy loam, 25-50% gravel & cobbles, EUC: SM
34-44 cm (13-17 in.) Dark brown, loamy, coarse sand, 55% gravel & cobbles, EUC: GM
44-100 cm (17-39 in.) Very dark, grayish brown, coarse sand, 70% gravel & cobbles, EUC: GP
Depth Class: Deep (greater than 100 cm)
Drainage Class: Well drained
Wetness Class: 1a, not wet above 150 cm for more than 1/12 of the time.
Permeability: Moderate (surface layers); rapid to very rapid (subsoil)

Minor Soil

Soil Name: Typic Cryorthods, loamy-skeletal, mixed (30%):
Vegetative Community: Birch, spruce, hemlock, rusty menziesia, alder and devil's club
Position on Landscape: Sideslopes and foot slopes underlain by glacial till
Sample Profile (Soil Number 24):
10-0 cm (4-0 in.) Moss, sticks, and needles over decomposed organic material.
0-2 cm (0-1 in.) Dark brown fine sandy loam, EUC: ML
2-7 cm (1-3 in.) Dark gray fine sandy loam, 5% gravel, EUC: ML
7-26 cm (3-10 in.) Dark reddish brown fine sandy loam, 15% gravel, EUC: ML
26-75 cm (10-30 in.) Very dark grayish brown sandy loam, 60% gravel & cobbles, EUC: GM
Depth Class: Deep (greater than 100 cm)
Drainage Class: Well drained
Wetness Class: 1a, not wet above 150 cm for more than 1/12 of the time.
Permeability: Moderate (surface layer); moderately slow to slow (glacial till)

Map Unit Group: 105--Continued

Slope Character: Concave to straight

Elevation: 400-1000 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Air Temperature:
28-35 F

Slope Range:	105A	0 - 8%
	105B	9 - 15%
	105C	16 - 25%
	105D	26 - 45%

Management Considerations:

Entire Map Unit

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads that are constructed out of in-place soils.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.

Shallow Excavations:

1. Excavations will become more limited and costly with steeper slopes.

Typic Cryorthods, Sandy-Skeletal, Mixed

Roads

1. Standard road construction methods can be used on slopes up to 45% without significantly decreasing the slope stability except in areas of wet or shallow soils.
2. The high sand and/or gravel content of the soils in this unit may not provide a road surface suitable for vehicle traffic.
3. Loose soils in vertical cutbanks will be subject to continuous ravelling.

Shallow Excavations

1. Cutbanks may cave in because of the high amount of sand and gravel.

Typic Cryorthods, Loamy-Skeletal, Mixed

Roads

1. Steep or long yarding paths, skid trails, 4-wheel drive roads, etc., are subject to erosion unless protected by adequate water bars or plant cover.

MAP UNIT DESCRIPTION

Map Unit Group: 201

This group consists of two Map Units: 201E and 201F.

Map Unit Composition:

Major Soil

Soil Name: Lithic Cryochrepts, loamy-skeletal, fixed (70%)
Vegetative Community: Hemlock, spruce, rusty menziesia, blueberry, feather moss
Position on Landscape: On hill crests in undulating topography or on sideslopes near cliffs
Sample Profile (Soil Number 25):
6-0 cm (2-0 in.) Leaves, roots and moss
0-6 cm (0-2 in.) Black, loamy, fine sand, 5% gravel, EUC: SM
6-15 cm (2-6 in.) Very dark, grayish brown, fine sandy loam, 50% gravel & cobbles, EUC: GM
15 cm (6 in.) Slate bedrock
Depth Class: Shallow (less than 50 cm)
Drainage Class: Well Drained
Wetness Class: 4a, wet between 25 and 50 cm for less than 1/12 of the time.
Permeability: Rapid

Minor Soil

Soil Name: Dystric Cryochrepts, loamy-skeletal, mixed (30%)
Vegetative Community: Hemlock, spruce, rusty menziesia, blueberry, and feather moss
Position on Landscape: Sideslopes and avalanche slopes which contain soil derived from glacial till.
Sample Profile (Soil Number 63):
2-0 cm (1-0 in.) Matted grass, sticks, leaves, and moss
0-14 cm (0-6 in.) Dark brown, loam, 50% gravel & cobbles, EUC: GM
14-30 cm (6-12 in.) Dark yellowish brown, fine sandy loam, 20% gravel, EUC: ML
30-42 cm (12-16 in.) Dark yellowish brown, sandy loam, 60% gravel & cobbles, EUC: GM
42-72 cm (16-28 in.) Olive gray, sandy loam, 75% gravel & cobbles, EUC: GP
Depth Class: Moderately deep (50-100 cm)
Drainage Class: Well drained
Wetness Class: 3a, wet above 50 to 100 cm less than 1/12 of the time.
Permeability: Moderately rapid; Slow to very slow in compact glacial till

Slope Character: Concave to convex

Map Unit Group: 201--Continued

Elevation: 700-1700 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Temperature:
28-34 F

Slope Range: 201E 46-65%
201F 66-100%

Management Considerations:

Entire Map Unit

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas in this map unit will require extensive excavation and expense to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.

Lithic Cryocrepts, Loamy-Skeletal, Mixed

Roads

1. Shale, slate or meta sandstone bedrock will be encountered near the surface of this soil.
2. Road cuts which expose soil over bedrock on sideslopes will decrease the slope stability, especially when the soil is wet.
3. Steep or long yarding paths, skid trails, 4-wheel drive roads, etc., are subject to erosion unless protected by adequate water bars or plant cover.

Trails

1. Shale, slate or meta sandstone bedrock will be encountered near the surface of this soil.

Campgrounds and Picnic Areas

1. Excavation for level areas for tent pads, table sites and vehicle or R.V. parking will be hindered by the presence of slate, shale of meta sandstone bedrock at or near the surface.

Shallow Excavations

1. Shale, slate or meta sandstone bedrock near the soil surface will make excavations more difficult and costly.

MAP UNIT DESCRIPTION

Map Unit Group: 202

This group consists of six Map Units: 202A, 202B, 202C, 202D, 202E, and 202F.

Map Unit Composition:

Major Soil

Soil Name: Dystric Cryochrepts, loamy-skeletal, mixed (85%) and similar soils

Vegetative Community: Spruce, birch, fern, bluejoint reedgrass and feather moss

Position on Landscape: Alluvial terraces, fans and river cut terraces

Sample Profile (Soil Number 34):

8-0 cm (3-0 in.)	Living moss, roots and twigs
0-4 cm (0-2 in.)	Dark brown, silt loam, 20% gravel & Cobble, EUC: ML
4-26 cm (2-10 in.)	Dark brown, loam, 50% gravel & cobble, EUC: GM
26-46 cm (10-18 in.)	Dark brown, silt loam, EUC: ML
46-86 cm (18-34 in.)	Dark grayish brown, loam, 70% gravel, cobbles & stones, EUC: GP
86-110 cm (34-44 in.)	Dark olive gray, loamy, coarse sand, 60% gravel & cobbles, EUC: GP

Depth Class: Deep (deeper than 100 cm)

Drainage Class: Well drained

Wetness Class: 1a, wet above 150 cm less than 1/12 of the time

Permeability: Rapid

Minor Soil

Soil Name: Histic Cryaquepts, loamy-skeletal, mixed(15%), (M.U. 204):

Vegetative Community: Spruce, hemlock, devil's club, horsetail, and feather moss

Position on Landscape: Seep areas on foot slopes

Slope Character: Convex to straight

Elevation: 400-1400 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Air Temperature: 28-32 F

Slope Range:	202A	0 - 8%
	202B	9 - 15%
	202C	16 - 25%
	202D	26 - 45%
	202E	46 - 65%
	202F	66 - 100%

Map Unit Group: 202--Continued

Management Considerations:

Roads

1. Some of the areas adjacent to streams are subject to occasional flooding.
2. Loose soils in vertical cutbanks will be subject to continuous ravelling.
3. The high content of coarse fragments over 3 inches in diameter may not provide a road surface suitable for traffic.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Trail construction on slopes over 45% will require extensive excavation during construction.
3. Loose soils in vertical cutbanks will be subject to continuous ravelling.
4. Some areas adjacent to streams are subject to occasional flooding.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or R.V. parking.
2. The occurrence of occasional flooding over all or part of the land in this map unit should be recognized in the design criteria for a campground or picnic area.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.
2. Cutbanks may cave in because of the high amount of sand and gravel.
3. Excavation will be hampered by large cobbles and stones.

MAP UNIT DESCRIPTION

Map Unit Group: 204

This group consists of three Map Units: 204A, 204B, and 204C.

Map Unit Composition:

Major Soil

Soil Name: Histric Cryaquepts, loamy-skeletal, mixed, and similar soils (60%)

Vegetative Community: Spruce, hemlock, devil's club, horsetail, feather moss

Position on Landscape: Seep areas and footslopes

Sample Profile (Soil Number 29):

33-0 cm (13-0 in.)	Moss, roots and sticks over decomposed organic muck
0-5 cm (0-2 in.)	Gray silt loam, 10% gravel, EUC: ML
5-15 cm (2-6 in.)	Dark brown silt loam, 35% gravel, EUC: ML
15-35 cm (6-14 in.)	Brown silt, 40% gravel, EUC: ML
35 cm (14 in.)	Water table

Depth Class: Moderately deep (50-100 cm)

Drainage Class: Poorly drained

Wetness Class: 4d, wet above 25 & 50 cm in depth greater than 1/2 of the time.

Permeability: Moderately slow

Minor Soil

Soil Name: Histric Cryaquepts, coarse silty, mixed (30%)

Vegetative Community: Spruce, alder, willow, ferns, bluejoint grass, moss.

Position on Landscape: Seep areas on footslopes

Sample Profile (Soil Number 61):

28-0 cm (11-0 in.)	Low shrubs, sticks and roots over decomposed organic muck
0-10 cm (0-4 in.)	Very dark grayish brown silt loam, EUC: ML
10-28 cm (4-11 in.)	Dark grayish brown silty clay loam, EUC: C1
28-75 cm (11-30 in.)	Dark grayish brown loam, EUC: ML

Depth Class: Deep (greater than 100cm)

Drainage Class: Somewhat poorly to poorly drained

Wetness Class: 3d, wet between 50 and 100cm more than 1/2 of the time.

Permeability: Slow

Minor Soil

Soil Name: Terric Borosaprists, loamy-skeletal, euic (10%), (M.U. 401):

Vegetative Community: Bluejoint grass, moss, wood fern, alder and spruce.

Position on Landscape: Low lying areas

Slope Character: Concave

Map Unit Group: 204--Continued

Elevation: 100-1000 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Air Temperature: 28-34 F

Slope Range:	204A	0 - 8%
	204B	9 - 15%
	204C	16 - 25%

Management Considerations:

Roads

1. The presence of a high water table, silty and clayey soils will make road construction very difficult and create extensive damage to the resource.
2. The excessive water in the soils of this map unit will glaciare with freezing temperatures.
3. These soils are commonly wet near the surface and should not be travelled by tracked or rubber tired vehicles unless they are frozen.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. A water table close to the soil surface will require special drainage considerations for seeping water.
3. The soils in this map unit will glaciare extensively with freezing temperatures.
4. All trail construction should be emphasized after the soils have drained from spring snow melt and are no longer saturated.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or R.V. parking.
2. The slow percolation rate of the fine textured top soil will cause ponding of water during wet periods.
3. The fine textured top soil will compact easily from people use and restrict plant growth and establishment.
4. A seasonal high water table will require special drainage considerations for any type of excavation activities required in campgrounds or picnic areas.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.
2. Excavation will be hampered by wet, fine textured non-supportive soils.
3. Cutbanks are unstable and will slump when saturated with water.

MAP UNIT DESCRIPTION (COMPLEX)

Map Unit Group: 205

This group consists of four Map Units: 205C, 205D, 205E, and 205F.

Map Unit Composition:

Major Soil

Soil Name: Dystric Cryochrepts, loamy-skeletal, mixed (50%)
Vegetative Community: Alder, many forb species, ferns, grasses & moss
Position on Landscape: Glacial till covered sideslopes and avalanche chutes
Sample Profile (Soil Number 63):
2-0 cm (1-0 in.) Matted grass, dead forbs, moss & roots
0-14 cm (0-6 in.) Dark brown, loam, 50% gravel & cobbles, EUC: GM
14-30 cm (6-12 in.) Dark yellowish brown, fine sandy loam, 20% gravel, EUC: ML
30-42 cm (12-16 in.) Dark yellowish brown, sandy loam, 60% gravel & cobbles, EUC: GM
42-72 cm (16-28 in.) Olive gray, sandy loam, 75% gravel & cobbles, EUC: GP
Depth Class: Moderately deep (50 to 100 cm)
Drainage Class: Well drained
Wetness Class: 3a, wet between 50-100 cm less than 1/12 of the time.
Permeability: Moderately rapid

Minor Soil

Soil Name: Typic Cryorthods, loamy-skeletal, mixed (30%)
Vegetative Community: Mountain hemlock, alder and devil's club
Position on Landscape: Glacial till covered sideslopes and avalanche chutes
Sample Profile (Soil Number 24):
10-0 cm (4-0 in.) Moss, sticks, and needles over decomposed organic material,
0-2 cm (0-1 in.) Dark Brown, fine sandy loam, EUC: ML
2-7 cm (1-3 in.) Dark Brown, fine sandy loam, 5% gravel, EUC: ML
7-26 cm (3-10 in.) Dark reddish brown, fine sandy loam, 15% gravel, EUC: LM
26-75 cm (10-30 in.) Very dark grayish brown, sandy loam, 60% gravel & cobbles, EUC: GM
Depth Class: Deep (greater than 100 cm)
Drainage Class: Well drained
Wetness Class: 1a, not wet above 150 cm for more than 1/12 of the time.
Permeability: Moderate (surface layers); moderately slow to slow (glacial till).

Map Unit Group: 205--Continued

Minor Soil

Soil Name: Histic Cryaquepts, loamy-skeletal, mixed (20%)
Vegetative Community: Devil's club, horsetail, feather moss
Position on Landscape: Seeps or wet soils on the footslopes
Sample Profile (Soil Number 29):
33-0 cm (13-0 in.) Moss, roots & sticks over decomposed organic muck
0-5 cm (0-2 in.) Gray, silt loam, 10% gravel, EUC: ML
5-15 cm (2-6 in.) Dark brown, silt loam, 35% gravel, EUC: ML
15-35 cm (6-14 in.) Brown silt, 40% gravel, EUC: ML
35 cm (14 in.) Water table, EUC: GM
Depth Class: Moderately deep (50-100 cm)
Drainage Class: Poorly drained
Wetness Class: 4d, wet above 25 & 50 cm in depth greater than 1/12 of the time.
Permeability: Moderately slow

Slope Character: Straight to concave or benchy

Elevation: 100-1400 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Air Temperature: 28-34 F

Slope Range:	205C	16 - 25%
	205D	26 - 45%
	205E	46 - 65%
	205F	66 - 100%

Management Considerations:

Entire Map Unit

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.

Dystic Cryochrepts, Loamy-Skeletal, Mixed and Typic Cryorthods, Loamy-Skeletal, Mixed

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads when they are constructed from in-place soils.
2. The soils in this map unit may be susceptible to mass wasting on slopes over 45% where they occur over impermeable compact till or when they are consistently wet.
3. Many areas in this map unit are located where there is an avalanche hazard which will restrict winter use.

Map Unit Group: 205--Continued

4. Steep or long yarding paths, skid trails, 4-wheel drive roads, etc., are subject to erosion unless protected by adequate water bars or plant cover.

Trails

1. Trail construction on slopes over 45% will require extensive excavation during construction.
2. Much of this map unit is located where there is an avalanche hazard which will restrict winter use.

Campgrounds and Picnic Areas

1. Much of this map unit is located in areas with an avalanche hazard which will restrict facility location and winter use.

Shallow Excavations

1. Compact glacial till may hamper excavation.

Histic Cryaquepts, Loamy-Skeletal, Mixed

Roads

1. The presence of a high water table, silty and clay like soils will make road construction very difficult and create extensive damage to the resource.
2. The excessive water in the soils of this map unit will glaciote with freezing temperatures.
3. These soils are commonly wet near the surface and should not be traveled by tracked or rubber tired vehicles unless they are frozen.
4. Road cuts on slopes over 45% will accelerate slumps or mud slides in saturated, fine textured soils which are included in 20% of this map unit.

Trails

1. A water table close to the soil surface will require special drainage considerations for seeping water.
2. The soils in this map unit will glaciote extensively with freezing temperatures.
3. The fine texture of the soil in this map unit will present extensive excavation, drainage and trail surface strength problems while it is wet and until it is compacted sufficiently to shed water.

Campgrounds and Picnic Areas

1. The slow percolation rate of the fine textured top soil will cause ponding of water during wet periods.
2. The fine textured top soil will compact easily from people use and restrict plant growth and establishment.
3. A seasonal high water table will require special drainage considerations for any type of excavation activities required in campgrounds or picnic areas.

Map Unit Group: 205--Continued

Shallow Excavations

1. Excavation will be hampered by wet, fine textured non-supportive soils.
2. Excavation should be emphasized when the soil has drained from spring snow melt.

MAP UNIT DESCRIPTION (COMPLEX)

Map Unit Group: 206

This group consists of three Map Units: 206D, 206E, and 206F.

Map Unit Composition:

Major Soil

Soil Name: Dystric Cryochrepts, loamy-skeletal, mixed and similar soils (70%),
Vegetative Community: Spruce, birch, rusty menziesia, blueberry, moss
Position on Landscape: River cut sideslopes of/or on remnant valley bottoms
Sample Profile (Soil Number 63):
2-0 cm (1-0 in.) Matted grass, dead forbs, sticks and moss
0-14 cm (0-6 in.) Dark brown, loam, 50% gravel & cobbles, EUC: GM
14-30 cm (6-12 in.) Dark yellowish brown, fine sandy loam, 20% gravel, EUC: ML
30-42 cm (12-16 in.) Dark yellowish brown, sandy loam, 60% gravel & cobbles, EUC: GM
42-72 cm (16-28 in.) Olive gray, sandy loam, 75% gravel & cobbles, EUC: GP
Depth Class: Moderately deep (50-100 cm)
Drainage Class: Well drained
Wetness Class: 3a, wet between 50 & 100 cm, less than 1/12 of the time
Permeability: Moderately rapid

Minor Soil

Soil Name: Typic Cryaquents, Loamy-skeletal, mixed, nonacid (30%)
Vegetative Community: Birch, cottonwood, devil's club, alder, and horse tail.
Position on Landscape: River cut sideslopes of/or on remnant valley bottoms
Sample Profile (Soil Number 64):
5-0 cm (2-0 in.) Dead leaves over live roots
0-25 cm (0-10 in.) Very dark grayish brown, sandy loam, 30% gravel, EUC: SM
25-63 cm (10-25 in.) Grayish brown, sandy clay loam, 40% gravel and cobbles, EUC: SP
63-180 cm (25-71 in.) Dark gray, clay loam, 50% gravel and cobbles, EUC: GC
Depth Class: Deep (greater than 100 cm)
Drainage Class: Poorly to somewhat poorly drained
Wetness Class: 5b, wet above 25 cm in depth 1/12 to 1/4 of the time.
Permeability: Slow

Slope Character: Concave to Straight

Map Unit Group: 206--Continued

Elevation: 400-1400 feet

Climatic Data (average annual): Precipitation: 20-30 in.; Air Temperature:
30-34 F

Slope Range:	206D	26 - 45%
	206E	46 - 65%
	206F	66 - 100%

Management Considerations:

Entire Map Unit

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Trail construction on slopes over 45% will require extensive excavation during construction.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.

Dystric Cryochrepts, Loamy-Skeletal, Mixed

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads when they are constructed from in-place soils.
2. The soils in this map unit are susceptible to mass wasting on slopes of increasing steepness starting at 25%, and construction activities requiring excavation will accelerate or stimulate this hazard.

Trails

1. Loose soils in verticle cutbanks will be subject to continuous ravelling.
2. Some areas adjacent to streams are subject to occasional flooding.

Campgrounds and Picnic Areas

1. The soils in this map unit are susceptible to mass wasting on slopes of increasing steepness starting at 25%, and construction activities requiring excavation will accelerate or stimulate this hazard.

Typic Cryaquents, Loamy-Skeletal, Mixed, Nonacid

Roads

1. Steep or long yarding paths, skid trails, 4-wheel drive roads, etc., are subject to erosion unless protected by adequate water bars or plant cover.
2. The presence of a high water table, silty and clay like soils will make road construction very difficult and create extensive damage to the resource.
3. The excessive water in the soils of this map unit will glaciare with freezing temperatures.
4. These soils are commonly wet near the surface and should not be traveled by tracked or rubber tired vehicles unless they are frozen.
5. This map unit has active or inactive slumps or debris flows and should be investigated on the ground by a Soil Scientist for each land impact activity.

Trails

1. A water table near the soil surface will require special drainage considerations for seeping water.
2. The soils in this map unit will glaciare extensively with cold temperatures.

Campgrounds and Picnic Areas

1. The slow percolation rate of the fine textured top soil will cause ponding of water during wet periods.

Shallow Excavations

1. Excavation should be emphasized when the soil has drained from spring snow melt.
2. Cutbanks are unstable and will slump when saturated with water.

MAP UNIT DESCRIPTION

Map Unit Group: 207

This group consists of three Map Units: 207A, 207B, 207C, and 207D.

Map Unit Composition:

Major Soil

Soil Name: Typic Cryumbrepts, loamy-skeletal, mixed and similar soils (85%)
Vegetative Community: Birch, bluejoint reedgrass and moss
Position on Landscape: Alpine river terraces above timberline

Sample Profile (Soil Number 20):

9-0 cm (4-0 in.) Leaves, matted grass, living roots and grass
0-22 cm (0-9 in.) Dark brown, loam, 25% gravel & cobbles.
EUC: ML
22-50 cm (9-20 in.) Dark brown, loam, 25% gravel & cobbles, EUC:
ML
50-76 cm (20-30 in.) Olive brown, sandy loam, 55% gravel, cobbles
& stones, EUC: GP
Depth Class: Moderately deep (50-100 cm)
Drainage Class: Somewhat poorly drained
Wetness Class: 3b, wet between 50 & 100 cm for 1/12 to 1/4
the time.
Permeability: Moderately rapid

Minor Soil

Soil Name: Typic Cryaquents, coarse loamy over sandy-skeletal, mixed (15%), (M.U. 303):
Vegetative Community: Alder, willow, moss and grass
Position on Landscape: Low areas where water collects or flows

Slope Character: Horizontal to undulating

Elevation: 500-1500 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Air Temperature:
28-32 F

Slope Range: 207A 0 - 8%
207B 9 - 15%
207C 16 - 25%
207D 26 - 45%

Management Considerations:

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads when they are constructed from in-place soils.
2. Normal road construction methods can be used without significantly decreasing the slope stability except in areas of wet or shallow soils.

Map Unit Group: 207--Continued

3. Many areas in this map unit are located where there is an avalanche hazard which will restrict winter use.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Much of this map unit is located where there is an avalanche hazard which will restrict winter use.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.
2. Much of this map unit is located in areas with an avalanche hazard which will restrict facility location and winter use.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.

MAP UNIT DESCRIPTION

Map Unit Group: 208

This group consists of six Map Units: 208A, 208B, 208C, 208D, 208E, and 208F.

Map Unit Composition:

Major Soil

Soil Name: Dystric Cryochrepts, loamy-skeletal, mixed and similar soils (85%)

Vegetative Community: Alder, many forb species, ferns, grasses & moss, lower areas of relief also have spruce, birch.

Position on Landscape: Sideslopes and avalanche slopes which contain soil derived from glacial till.

Sample Profile (Soil Number 63):

2-0 cm (1-0 in.)	Matted grass, sticks, leaves, moss
0-14 cm (0-6 in.)	Dark brown, loam, 50% gravel & cobbles, EUC: GM
14-30 cm (6-12 in.)	Dark yellowish brown, fine sandy loam, 20% gravel, EUC: ML
30-42 cm (12-16 in.)	Dark Yellowish brown, sandy loam, 60% gravel & cobbles, EUC: GM
42-72 cm (16-28 in.)	Olive gray, sandy loam, 75% gravel & cobbles, EUC: GP

Depth Class: Moderately deep (50-100 cm)

Drainage Class: Well drained

Wetness Class: 3a, wet above 50 to 100 cm less than 1/12 of the time.

Permeability: Moderately rapid, in compact glacial till, slow to very slow

Minor Soil

Soil Name: Histic Cryaquepts, loamy-skeletal, mixed (15%), (M.U. 204):

Vegetative Community: Spruce, birch, ferns, bluejoint reedgrass & feather moss

Position on Landscape: Areas on lower sideslopes where soils contain some compacted till

Slope Character: Straight to concave

Elevation: 400-1400 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Air Temperature: 28-32 F

Slope Range:	208A	0 - 8%
	208B	9 - 15%
	208C	16 - 25%
	208D	26 - 45%
	208E	46 - 65%
	208F	66 - 100%

Management Considerations:

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads when they are constructed out of in-place soils.
2. Normal road construction methods can be used on slopes up to 65% without significantly decreasing the slope stability except in areas of wet or shallow soils.
3. Many areas in this map unit are located where there is an avalanche hazard which will restrict winter use.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Trail construction on slopes over 45% will require extensive excavation during construction.
3. Much of this map unit is located where there is an avalanche hazard which will restrict winter use.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.
2. Much of this map unit is located in areas with an avalanche hazard which will restrict facility location and winter use.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.
2. Compact glacial till may hamper excavation.

MAP UNIT DESCRIPTION

Map Unit Group: 211

This group consists of two Map Units: 211B and 211C.

Map Unit Composition:

Major Soil

Soil Name: Pergelic Cryochrepts, loamy-skeletal, mixed and similar soils (90%)

Vegetative Community: Western hemlock, spruce, rusty menziesia and moss

Position on Landscape: Remnant valley bottoms or topslopes

Sample Profile (Soil Number 62):

10-0 cm (4-0 in.)	Moss, needles and sticks
0-2.5 cm (0-1 in.)	Very dark brown, silt loam, EUC: ML
2.5-15 cm (1-6 in.)	Grayish brown, silt loam, EUC: ML
15-46 cm (6-18 in.)	Dark yellowish brown, silt loam, 10% gravel & cobbles, EUC: ML
46-56 cm (18-22 in.)	Dark yellowish brown, silt loam, 50% gravel & cobbles, EUC: GM

Depth Class: Deep (greater than 100 cm)

Drainage Class: Well drained

Wetness Class: 2a, wet between 100 & 150 cm less than 1/12 of the time

Permeability: Moderate

Minor Soil

Soil Name: Histic Cryaquepts, loamy-skeletal, mixed (10%), (M.U. 204):

Vegetative Community: Spruce, hemlock, devil's club, alder, grass and moss

Position on Landscape: Interspersed

Slope Character: Rolling

Elevation: 400-800 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Air Temperature: 28-34 F.

Slope Range:	211B	9 - 15%
	211C	16 - 25%

Management Considerations:

Roads

1. The high silt and clay content of the soils in this map unit will not provide a road surface suitable for traffic.
2. Steep or long yarding paths, skid trails, 4-wheel drive roads, etc., are subject to erosion unless protected by adequate water bars or plant cover.
3. These soils are highly susceptible to compaction and should either be skidded on when the surface is frozen or the skid trails monitored so the organic layer is not totally removed.

Map Unit Group: 211--Continued

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Long or steep sections of trail are subject to erosion unless protected by adequate water bars or diversions or vegetation cover.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.
2. This map unit has cold and/or frozen soils which should be recognized in the design of campgrounds and picnic areas.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.
2. Patches of frozen soil may hamper excavation.

MAP UNIT DESCRIPTION

Map Unit Group: 301

This group consists of two Map Units: 301A and 301B.

Map Unit Composition:

Major Soil

Soil Name:	Typic Cryaquents, sandy-skeletal, mixed and similar soils (90%)
Vegetative Community:	Alder, willow, spruce, horsetail, grass and moss
Position on Landscape:	Seep slopes and stable, gravelly floodplains with high water table
Sample Profile (Soil Number 16):	
10-0 cm (4-0 in.)	Moss roots and moss.
0-15 cm (0-6 in.)	Very dark gray, coarse sand, 75% fine & regular gravel, EUC: GP
15-30 cm (6-12 in.)	Dark gray, loamy sand, 50% fine & regular gravel, EUC: GM
30-64 cm (12-25 in.)	Very dark gray, loamy sand, 55% fine & regular gravel, EUC: GM
Depth Class:	Deep (greater than 100 cm)
Drainage Class:	Poorly drained
Wetness Class:	4d, wet between 25 & 50 cm for greater than 1/2 of the time
Permeability:	Rapid to very rapid

Minor Soil

Soil Name:	Typic Cryofluents, loamy-skeletal, mixed, nonacid (90%), (M.U. 304):
Vegetative Community:	Birch, spruce and moss
Position on Landscape:	Higher and drier second level terraces

Slope Character: Concave & flat

Elevation: 0-100 feet

Climatic Data (average annual): Precipitation: 20-80 in.; Air Temperature: 32-36 F

Slope Range:	301A	0 - 8%
	301B	9 - 15%

Management Considerations:

Roads

1. A water table near the soil surface will require special drainage and excavation considerations for road construction.
2. Some of the areas adjacent to streams are subject to occasional flooding.
3. The overlying organic mat must be maintained or replaced to allow revegetation or reforestation following impactive activities.

Map Unit Group: 301--Continued

4. These soils are commonly wet near the surface and should not be traveled by vehicles with tracks or rubber tires unless they are frozen.

Trails

1. Some areas adjacent to streams are subject to occasional flooding.
2. A water table near the soil surface will require special drainage considerations for seeping water.

Campgrounds and Picnic Areas

1. The occurrence of flooding over all or part of this map unit should be recognized in the design criteria for a campground or picnic area.
2. A seasonal high water table will require special drainage considerations for any type of excavation activities required in campgrounds or picnic areas.

Shallow Excavations

1. Cutbanks may cave in because of the high amount of sand and gravel.
2. Water will commonly be encountered near the soil surface.
3. Parts of this map unit are subjected to occasional flooding.

MAP UNIT DESCRIPTION

Map Unit Group: 302

This group consists of three Map Units: 302A, 302B, and 302C.

Map Unit Composition:

Major Soil

Soil Name: Typic Cryorthents, sandy-skeletal, mixed and similar soils (85%)
Vegetative Community: Alder, cottonwood, spruce
Position on Landscape: River terraces adjacent relatively high gradient streams
Sample Profile (Soil Number 19):
10-0 cm (4-0 in.) Mosses, leaves and sticks
0-16 cm (0-6 in.) Dark reddish brown, fine sandy loam, EUC: SM
16-44 cm (6-18 in.) Very dark grayish brown, coarse sandy loam, EUC: SM
44-100 cm (18-40 in.) Very dark gray, loamy, very coarse sand, 65% gravel, 5% cobbles, EUC: GP
Depth Class: Deep (greater than 100 cm)
Drainage Class: Somewhat excessively drained
Wetness Class: 1a, wet above a depth of 150 cm for less than 1/12 of the time.
Permeability: Rapid

Minor Soil

Soil Name: Typic Cryaquents, sandy-skeletal, mixed (15%), (M.U. 301)
Vegetative Community: Oak fern, fireweed, bluejoint
Position on Landscape: Low areas within map unit with high water table or inundated from floodwater

Slope Character: Concave & Straight

Elevation: 400-1400 feet

Climatic Data (average annual): Precipitation: 20-80 in.; Air Temperature: 28-34 F.

Slope Range:	302A	0 - 8%
	302B	9 - 15%
	302C	16 - 25%

Management Considerations:

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads when they are constructed out of in-place soils.
2. The overlying organic mat must be maintained or replaced to allow revegetation or reforestation following impactive activities.
3. These soils are commonly wet near the surface and should not be traveled by vehicles with tracks or rubber tires unless they are frozen.

Map Unit Group: 302--Continued

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Some areas adjacent to streams are subject to occasional flooding.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.
2. The occurrence of sandy soils and/or a high percentage of coarse fragments in this map unit should be recognized in the design of campgrounds and picnic areas.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.
2. Cutbanks may cave in because of the high amount of sand and gravel.
3. Parts of this map unit are subject to occasional flooding.

MAP UNIT DESCRIPTION

Map Unit Group: 303

This group consists of two Map Units: 303A and 303B.

Map Unit Composition:

Major Soil

Soil Name:	Typic Cryaquents, coarse loamy over sandy-skeletal, mixed and similar soils (95%)
Vegetation Community:	Spruce, alder, willow, grass, club moss
Position on Landscape:	First level wet terraces, floodplains and valley bottoms
Sample Profile (Soil Number 50):	
12-0 cm (5-0 in.)	Leaves, grass, sticks
0-20 cm (0-8 in.)	Dark brown, loamy fine sand, 10% gravel; EUC: SM.
20-36 cm (8-14 in.)	Dark brown, fine sandy loam, 10% gravel; EUC: SM
36-62 cm (14-24 in.)	Dark grayish brown, coarse sand; 80% gravel & cobbles; EUC: GP
62 cm (24 in.)	Watertable
Depth Class:	Deep (greater than 100 cm)
Drainage Class:	Somewhat poorly drained
Wetness Class:	3d, wet between 50 & 100 cm more than 1/2 of the time
Permeability:	Moderate

Slope Character: Straight

Elevation: 0-700 feet

Climatic Data (average annual): Precipitation: 10-30 in.; Air Temperature: 25-34 F

Slope Range:	303A	0 - 8%
	303B	9 - 15%

Management Considerations:

Roads

1. The high sand and/or gravel content of the soils in this unit may not provide a road surface suitable for vehicle traffic.
2. Some of the areas adjacent to streams are subject to occasional flooding.
3. The overlying organic mat must be maintained or replaced to allow revegetation or reforestation following impactive activities.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Some areas adjacent to streams are subject to occasional flooding.

Map Unit Group: 303--Continued

Campgrounds and Picnic Areas

1. The occurrence of flooding over all or part of this map unit should be recognized in the design criteria for a campground or picnic area.
2. A seasonal high water table will require special drainage considerations for any type of excavation activities required in campgrounds or picnic areas.
3. The occurrence of sandy soils and/or a high percentage of coarse fragments in this map unit should be recognized in the design of campgrounds and picnic areas.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.
2. Parts of this map unit are subject to occasional flooding.
3. Cutbanks may cave in because of the high amount of sand and gravel.

MAP UNIT DESCRIPTION

Map Unit Group: 304

This group consists of two Map Units: 304A and 304B.

Map Unit Composition:

Major Soil

Soil Name: Typic Cryofluvents, loamy-skeletal, mixed nonacid and similar soils (85%)
Vegetative Community: Cottonwood, spruce, ferns, devil's club, moss
Position on Landscape: Second level terraces near streams with relatively lower gradient
Sample Profile (Soil Number 7):
10-0 cm (4-0 in.) Living moss, needles and roots
0-8 cm (0-3 in.) Dark grayish brown, loam, EUC: ML
8-18 cm (3-7 in.) Very dark gray, sand, EUC: SM
18-22 cm (7-9 in.) Dark grayish brown, silt loam, 30% gravel, EUC: ML
22-50 cm (9-20 in.) Olive gray-dark brown, loam to sandy loam, EUC: ML
50-100 cm (20-39 in.) Dark olive gray, sandy loam, 50% gravel & 10% cobbles, EUC: GM
Depth Class: Deep (greater than 100 cm)
Drainage Class: Well drained
Wetness Class: 2b, wet between 100 & 150 cm 1/12 to 1/4 of the time
Permeability: Moderately rapid

Minor Soil

Soil Name: Typic Cryaquents, sandy-skeletal, mixed (15%) (M.U. 301)
Vegetative Community: Spruce, alder, willow, grass, club moss
Position on Landscape: Low areas subject to frequent flooding or with high water table

Slope Character: Straight

Elevation: 0-300 feet

Climatic Data (average annual): Precipitation: 30-60 in.; Air Temperature: 32-36 F.

Slope Range: 304A 0 - 8%
304B 9 - 15%

Management Considerations:

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads when they are constructed out of in-place soils.

Map Unit Group: 304--Continued

2. The overlying organic mat must be maintained or replaced to allow revegetation or reforestation following impactive activities.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.

Campgrounds and Picnic Areas

1. The occurrence of flooding over all or part of this map unit should be recognized in the design criteria for a campground or picnic area.

Shallow Excavations

1. Parts of this map unit are subject to occasional flooding.

MAP UNIT DESCRIPTION

Map Unit: 305

Map Unit Composition:

Major Soil

Soil Name: Talus from placer mining M.U. 304 (85%)
Vegetative Community: Fireweed
Position on Landscape: Unit consists of talus piles about 15-20 feet high consisting of rounded cobbles, stones and gravels interspersed throughout the map unit.

Sample Profile:

0-150 cm (0-60 in.) Cobbles and stones 80%, gravel 15%, Not enough fines to fill air spaces inbetween coarse fragments.

Depth Class: Deep (greater than 100 cm)

Drainage Class: Excessively drained

Wetness Class: 1a, wet above 150 cm less than 1/2 of the time.

Permeability: Very rapid

Minor Soil

Soil Name: Typic Cryofluvents, loamy-skeletal, mixed nonacid and similar soils (15%) (M.U. 304)
Vegetative Community: Cottonwood, spruce, ferns, devil's club, moss
Position on Landscape: Second level terraces near streams with relatively lower gradient

Slope Character: Convex to concave

Elevation: 0-300 feet

Climatic Data (average annual): Precipitation: 30-60 in.; Air Temperature: 32-36 F

Slope Range: Variable

Management Considerations:

Roads

1. The overlying organic mat must be maintained or replaced to allow revegetation or reforestation following impactive activities.
2. The high content of coarse fragments over three inches in diameter may not provide a road surface suitable for traffic.

Map Unit Group: 305--Continued

Trails

1. Some areas adjacent to streams are subject to occasional flooding.
2. Much of this map unit contains piles of large cobbles and stones which increase the difficulty of trail construction.

Campgrounds and Picnic Areas

1. The occurrence of occasional flooding over all or part of this map unit should be recognized in the design criteria for a campground or picnic area.

Shallow Excavations

1. Parts of this map unit are subject to occasional flooding.
2. Excavation will be hampered by large cobbles and stones.

MAP UNIT DESCRIPTION

Map Unit Group: 306

This group consists of three Map Units: 306C, 306D, and 306E.

Map Unit Composition:

Major Soil

Soil Name: Typic Cryaquents, loamy-skeletal, mixed nonacid and similar soils (85%)

Vegetative Community: Birch, spruce, cottonwood, devil's club, alder, horsetail.

Position on Landscape: River cut sideslopes in remnant valley bottoms.

Sample Profile (Soil Number 64):

5-0 cm (2-0 in.)	Dead leaves over live roots
0-25 cm (0-10 in.)	Very dark grayish brown, sandy loam, 30% gravel, EUC: SM
25-63 cm (10-25 in.)	Grayish brown, sandy, clay loam; 40% gravel and cobbles, EUC: SC
63-150 cm (25-71 in.)	Dark gray, clay loam, 50% gravel and cobbles, EUC: GC

Depth Class: Deep (greater than 100 cm)

Drainage Class: Poorly to somewhat poorly drained

Wetness Class: 5b, wet above 25 cm in depth 1/12 to 1/4 of the time.

Permeability: Slow

Minor Soil

Soil Name: Dystric Cryorbepts, loamy-skeletal, mixed (15%), (M.U. 202)

Vegetative Community: Spruce, birch, ferns, bluejoint reedgrass and feather moss.

Position on Landscape: Drier areas within map unit.

Slope Character: Convex to straight

Elevation: 200-1200 feet

Climatic Data (average annual): Precipitation: 20-40 in.; Air Temperature: 28-34 F.

Slope Range:	306C	16 - 25%
	306D	26 - 45%
	306E	46 - 65%

Management Considerations:

Roads

1. The presence of a high water table, silty and clayey soils will make road construction very difficult and create extensive damage to the resource.
2. The excessive water in the soils of this map unit will glacialize with freezing temperatures.

Map Unit Group: 306--Continued

3. These soils are commonly wet near the surface and should not be traveled by vehicles with tracks or rubber tires unless they are frozen.
4. The soils in this map unit are susceptible to mass wasting on slopes of increasing steepness starting at 25%, and construction activities requiring excavation will accelerate or stimulate this hazard.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Trail construction on slopes over 45 percent will require extensive excavation during construction.
3. Common avalanche occurrences will restrict winter use.
4. The soils in this map unit will glacialize extensively with cold temperatures.

Campgrounds and Picnic Areas

1. Construction of campgrounds and picnic areas on slopes greater than 15% will require extensive excavation to produce level areas for tables, tent pads and vehicle or recreational vehicle parking.
2. The slow percolation rate of the fine textured soil layers will cause ponding of water during wet periods.
3. The occurrence of a high percentage of coarse fragments in the soils of this map unit should be recognized in the design of campgrounds and picnic areas.

Shallow Excavations

1. Excavations will become more limited and costly with steeper slopes.
2. Excavation will be hampered by wet, fine textured nonsupportive soils.
3. Cutbanks are unstable and will slump when saturated with water.

MAP UNIT DESCRIPTION

Map Unit Group: 401

This group consists of two Map Units: 401A and 401B.

Map Unit Composition:

Major Soil

Soil Name: Terric Borosaprist, loamy-skeletal, mixed, euic and similar soils (90%)
Vegetative Community: Bluejoint grass, moss, wood fern, alder, spruce
Position on Landscape: Depressions on terraces or in valley bottoms lined with glacial till or lacustrine silt
Sample Profile (Soil Number 36):
0-10 cm (0-4 in.) Moss & matted grass, EUC: PT
10-18 cm (4-7 in.) Gray loam, EUC: PT
18-67 cm (7-26 in.) Black, sapric muck, EUC: PT
67-100 cm (26-39 in.) Dark gray, clay loam, 60% gravel & Cobbles, EUC: GC
Depth Class: Deep (greater than 100 cm)
Drainage Class: Very poorly drained
Wetness Class: 5d, wet above 25 cm more than 1/2 of the time
Permeability: Moderately slow (organic), slow to very slow (mineral)

Minor Soil

Soil Name: Hystic Cryaquepts, coarse silty, mixed (10%), (M.U. 204)
Vegetative Community: Spruce, hemlock, devil's club, horsetails feather moss
Position on Landscape: Near outer perimeter of depressions

Slope Character: Concave

Elevation: 500-1500 feet

Climatic Data (average annual): Precipitation: 40-60 in.; Air Temperature: 28-32 F

Slope Range: 401A 0 - 8%
401B 9 - 15%

Management Considerations:

Roads

1. The large amounts of organic matter and high water table will require large amounts of overlay material to raise road beds or extensive excavation and drainage measures to construct a road.
2. The high silt and clay content of the soils in this map unit will not provide a road surface suitable for traffic.

Map Unit Group: 401--Continued

3. All mechanized vehicle traffic should be restricted to when this soil is snow covered and frozen.

Trails

1. The soil in this unit is organic and will require overlay type methods and special trail construction techniques.
2. A water table near the soil surface will require special drainage considerations for seeping water.

Campgrounds and Picnic Areas

1. This map unit has extensive organic soils which should be avoided in the selection of this site for campgrounds and picnic areas.
2. A seasonal high water table will require special drainage considerations for any type of excavation activities required in campgrounds or picnic areas.

Shallow Excavations

1. Excavation will be hampered by a considerable amount of organic material, fine textured soils and water.

MAP UNIT DESCRIPTION

Map Unit: 402A

Map Unit Composition:

Major Soil

Soil Name:	Tidal Flats and similar soils (100%)
Soil Vegetation:	None
Position on Landscape:	Tidal Flats
Sample Profile:	Marine silts and fine sands
Depth Class:	Deep
Drainage Class:	Very poorly drained
Wetness Class:	5d, wet above 25 cm more than 1/2 of the time.
Permeability:	Slow

Slope Character: Flat

Elevation: Sea Level

Climatic Data (average annual): Precipitation: 40-80 in.; Air
Temperaure: 36-38 F

Slope Range: 0-8%

Management Considerations:

Roads

1. Large amounts of fill material will be necesssary to construct a road surface above maximum high tide levels.

Trails

1. This unit floods twice daily.

Campgrounds and Picnic Areas

1. This unit floods twice daily.

Shallow Excavations

1. Excavation will be hampered by saturated fine textured soils and daily high tides.

MAP UNIT DESCRIPTION

Map Unit: GP

Map Unit Composition:

Major Soil

Soil Name:	Gravel Pits and similar soils (100%)
Vegetative Community:	Birch, aspen, willow, and fireweed
Position on Landscape:	On alluvial terraces and fans
Sample Profile:	Gravels and sands
Depth Class:	Deep (greater than 100 cm)
Drainage Class:	Well drained
Wetness Class:	1a, wet above 150 cm less than 1/2 of the time.
Permeability:	Rapid

Slope Character:	Flat bottoms; steep, straight cut walls
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Elevation:	0-1400 feet
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Climatic Data (average annual):	Precipitation: 20-60 in.; Air Temperature: 28-34 F
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Slope Range:	0-45%
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MAP UNIT DESCRIPTION

Map Unit: Ch

Map Unit Composition:

Major Soil

Soil Name:	Chena very gravelly sand, 0 to 3 percent slopes and similar soils (95%)
Vegetative Community:	Cottonwood and alder
Position on Landscape:	Low stream terraces and flood plains
Sample Profile:	
5-0 cm (2-0 in.)	Dark reddish brown, partially decomposed twigs
0-127 cm (0-50 in.)	Brown sand, 50% gravel, EUC.: SP
Depth Class:	Deep (greater than 100 cm)
Drainage Class:	Well drained
Wetness Class:	2b, wet between 100 cm and 150 cm for 1/12 to 1/4 of the time
Permeability:	Rapid

Elevation: 0-50 feet

Climatic Data (average annual): Precipitation: 40-80 in.; Air Temperature: 36-38 F

Slope Range: 0 - 8%

Management Considerations:

Roads

1. The high sand and/or gravel content of the soils in this unit may not provide a road surface suitable for vehicle traffic.
2. Some of the areas adjacent to streams are subject to occasional flooding.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Some areas adjacent to streams are subject to occasional flooding.

Campgrounds and Picnic Areas

1. The occurrence of occasional flooding over all or part of this map unit should be recognized in the design criteria for a campground or picnic area.
2. The occurrence of sandy soils and/or a high percentage of coarse fragments in this map unit should be recognized in the design of campgrounds and picnic areas.

Map Unit: Ch

Shallow Excavations

1. Excavation should be emphasized when the soil has drained from spring snowmelt.

MAP UNIT DESCRIPTION

Map Unit: C1

Map Unit Composition:

Major Soil

Soil Name: Clunie peat, 0 to 3 percent
slopes and similar soils (95%)
Vegetative Community: Sphagnum moss, sedges and willows
Position on Landscape: Broad depressions on tidal plains

Minor Soil

Soil Name: Gr soils
Vegetation Community: Sphagnum moss, sedges, and willow
Position on Landscape: These soils occupy broad
depressions between the tidal
flats and the mountains.

Sample Profile:

0-71 cm (0-28 in.)	Dark yellowish brown, moss & sedge peat, EUC: PT
71-97 cm (28-38 in.)	Dark yellowish brown, moss & sedge peat, EUC: PT
97-125 cm (38-50 in.)	Gray, very fine, sandy loam, EUC: ML
Depth Class:	Deep (greater than 100 cm)
Drainage Class:	Very poorly drained
Wetness Class:	5d, wet above 25cm more than 1/2 of the time
Permeability:	Rapid in the organic material, slow in the mineral soil

Elevation: 0-50 feet

Climatic Data (average annual): Precipitation: 40-80 in.; Air
Temperature: 36-38 F

Slope Range: 0 - 8%

Management Considerations:

Roads

1. The large amounts of organic matter and high water table and floods will require large amounts of overlay material to raise road beds or extensive excavation and drainage measures to construct a road.
2. The high silt and clay content of the soils in this map unit will not provide a road surface suitable for traffic.
3. All mechanized vehicle traffic should be restricted to when this soil is snow covered and frozen.

Map Unit: C1--Continued

Trails

1. The soil in this unit is organic and will require overlay type methods and special trail construction techniques.
2. A water table near the soil surface will require special drainage considerations for seeping water.

Campgrounds and Picnic areas

1. This map unit has extensive organic soils which should be avoided in the selection of this site for campgrounds and picnic areas.
2. A seasonal high water table will require special drainage considerations for any type of excavation activities required in campgrounds or picnic areas.
3. The occurrence of occasional flooding over all or part of this map unit should be recognized in the design criteria for a campground or picnic area.

Shallow Excavations

1. Excavation will be hampered by a considerable amount of organic material, fine textured soils and water.
2. Parts of this map unit are subject to occasional flooding.

MAP UNIT DESCRIPTION

Map Unit: Cn

Map Unit Composition:

Major Soil

Soil Name:	Cryaquents, loamy with no slope and similar soils (75%)
Vegetative Community:	Sedges, grasses and shrubs where not inundated by the tide
Position on Landscape:	Low-lying coastal plains inundated periodically by tidal water
Sample Profile:	
2.5-0 cm (1-0 in.)	Partially decomposed sedge peat.
0-8 cm (0-3 in.)	Dark grayish brown, very fine, sandy loam, EUC: ML
8-30 cm (3-12 in.)	Dark gray, very fine, sandy loam, EUC: ML
30-150 cm(12-60 in.)	Dark gray, very fine, sandy loam, EUC: ML
Depth Class:	Deep (greater than 100 cm)
Drainage Class:	Poorly to very poorly drained
Wetness Class:	4d, wet between 25 cm & 50 cm for more than 1/2 of the time.
Permeability:	Moderately slow

Minor Soil

Soil Name:	Clunie peat (15%)
Vegetation Community:	Sphagnum moss, sedges, and willow
Position on Landscape:	Low-lying basins

Minor Soil

Soil Name:	Staves soils (10%)
Vegetative Community:	Cottonwood, alder, and willow
Position on Landscape:	The narrow band of levels bordering stream channels

Elevation: 0-50 feet

Climatic Data (average annual): Precipitation: 40-80 in.; Air Temperature: 36-38 F

Slope Range: 0 - 8%

Management Considerations:

Roads

1. A water table near the soil surface will require special drainage and excavation considerations for road construction.

Map Unit: Cn--Continued

2. These soils are commonly wet near the surface and should not be traveled by vehicles with tracks or rubber tires unless the soil is frozen.
3. Large amounts of fill material will be necessary to construct a road surface above maximum high tide levels.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. The fine texture of the soil in this map unit will present extensive excavation, drainage and trail surface strength problems while it is wet and until it is compacted sufficiently to shed water.

Campgrounds and Picnic Areas

1. A seasonal high water table will require special drainage considerations for any type of excavation activities required in campgrounds or picnic areas.
2. The slow percolation rate of the fine textured top soil will cause ponding of water during wet periods.
3. The fine textured top soil will compact easily from people use and restrict plant growth and establishment.

Shallow Excavations

1. Water will commonly be encountered near the soil surface.
2. Parts of this map unit are subject to occasional flooding.
3. Excavation will be hampered by wet, fine textured nonsupportive soils.

MAP UNIT DESCRIPTION

Map Unit: Gr

Map Unit Composition:

Major Soil

Soil Name: Gr peat, 0 to 3 percent slopes and similar soils (85%)
Vegetative Community: Sphagnum moss, sedges and willows
Position on Landscape: Broad depressions between tidal flats and the mountains
Sample Profile:
 0-10 cm (0-4 in.) Dark brown moss peat, EUC: PT
 10-18 cm (4-7 in.) Gray moss peat, EUC: PT
 18-41 cm (7-16 in.) Olive brown moss peat, EUC: PT
 41-163 cm (16-64 in.) Gray moss peat, 5 to 10% mineral, EUC: PT
Depth Class: Deep (greater than 100 cm)
Drainage Class: Very poorly drained
Wetness Class: 5d, wet above 25 cm more than 1/2 of the time.
Permeability: Rapid in the organic material.

Minor Soil

Soil Name: Clunie soils (15%)
Vegetation Community: Sphagnum moss, sedge, and willow
Position on Landscape: Broad depressions on tidal flats

Elevation: 0-50 feet

Climatic Data (average annual): Precipitation: 40-80 in.; Air Temperature: 36-38 F

Slope Range: 0 - 8%

Management Considerations:

Roads

1. The large amounts of organic matter, high water table, and floods will require large amounts of overlay material to raise road beds or extensive excavation and drainage measures to construct a road.
2. All mechanized vehicle traffic should be restricted to when this soil is snow covered and frozen.

Trails

1. The soil in this unit is organic and will require overlay type methods and special trail construction techniques.
2. A water table near the soil surface will require special drainage considerations for seeping water.
3. Some areas adjacent to streams are subject to occasional flooding.

Map Unit: Gr--Continued

Campgrounds and Picnic Areas

1. This map unit has extensive organic soils which should be avoided in the selection of this site for campgrounds and picnic areas.
2. A seasonal high water table will require special drainage considerations for any type of excavation activities required in campgrounds or picnic areas.
3. The occurrence of occasional flooding over all or part of this map unit should be recognized in the design criteria for a campground or picnic area.

Shallow Excavations

1. Excavation will be hampered by a considerable amount of organic material, fine textured soils and water.
2. Parts of this map unit are subject to occasional flooding.

MAP UNIT DESCRIPTION

Map Unit: Nk

Map Unit Composition:

Major Soil

Soil Name:	Niklason sandy loam, 0 to 3 percent slopes and similar soils (85%)
Vegetative Community:	Cottonwood, paper birch, and alder
Position on Landscape:	Alluvial plains and stream terraces
Sample Profile:	
0-20 cm (0-8 in.)	Dark grayish brown, sandy loam; EUC: SM
20-91 cm (8-36 in.)	Gray gray, loamy fine sand, EUC: SM
91-102 cm (36-40 in.)	Dark gray, loamy sand, 45% gravel, EUC: SM
Depth Class:	Deep (greater than 100 cm)
Drainage Class:	Well drained
Wetness Class:	2a, wet between 100 cm & 150 cm for less than 1/12 of the time.
Permeability:	Rapid

Minor Soil

Soil Name:	Chena (15%)
Vegetation Community:	Cottonwood and alder
Position on Landscape:	Terraces and alluvial plains

Elevation: 0-50 feet

Climatic Data (average annual): Precipitation: 40-80 in.; Air Temperature: 36-38 F

Slope Range: 0 - 8%

Management Considerations:

Roads

1. The soils in this map unit are normally suitable for low use roads such as skid trails and mining roads when they are constructed from in-place soils.
2. Some of the areas adjacent to streams are subject to occasional flooding.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.
2. Some areas adjacent to streams are subject to occasional flooding.

Map Unit: Nk--Continued

Campgrounds and Picnic Areas

1. The occurrence of sandy soils and/or a high percentage of coarse fragments in this map unit should be recognized in the design of campgrounds and picnic areas.

Shallow Excavations

1. Cutbanks may cave in because of the high amount of sand and gravel.
2. Parts of this map unit are subjected to occasional flooding.

MAP UNIT DESCRIPTION

Map Unit: St

Map Unit Composition:

Major Soil

Soil Name: Stave fine sandy loam, 0 to 3 percent slopes and similar soils (85%)
Vegetative Community: Cottonwood, alder and willow
Position on Landscape: Sandy alluvium on flood plains

Minor Soil

Soil Name: Cryaquents (15%)
Vegetation Community: Sedges, grasses and shrubs
Position on Landscape: Low basins with thicker mat
Sample Profile:
 2-0 cm (1-0 in.) Partially decomposed grass.
 0-8 cm (0-3 in.) Dark grayish brown fine sandy loam, EUC: ML
 8-40 cm (3-16 in.) Very dark gray loamy sand, EUC: SM
 40-127 cm (16-50 in.) Very dark gray sand, EUC: SW
 127-152 cm (50-60 in.) Very dark gray sand, 25% gravel, EUC: SW
Depth Class: Deep (greater than 100 cm)
Drainage Class: Moderately well drained
Wetness Class: 3a, wet between 50 cm & 100 cm from 1/4 to 1/2 of the time.
Permeability: Rapid

Elevation: 0-50 feet

Climatic Data (average annual): Precipitation: 40-80 in.; Air Temperature: 36-38 F

Slope Range: 0 - 8%

Management Considerations:

Roads

1. The high sand and/or gravel content of the soils in this unit may not provide a road surface suitable for vehicle traffic.
2. A water table near the soil surface will require special drainage and excavation considerations for road construction.
3. Some of the areas adjacent to streams are subject to occasional flooding.

Trails

1. All decomposed organic matter should be removed from the trail surface to prevent a slippery tread when wet.

Map Unit: St--Continued

2. Some areas adjacent to streams are subject to occasional flooding.

Campgrounds and Picnic Areas

1. The occurrence of occasional flooding over all or part of this map unit should be recognized in the design criteria for a campground or picnic area.
2. The occurrence of sandy soils and/or a high percentage of coarse fragments in this map unit should be recognized in the design of campgrounds and picnic areas.

Shallow Excavations

1. Cutbanks may cave in because of the high amount of sand and gravel.
2. Parts of this map unit are subject to occasional flooding.

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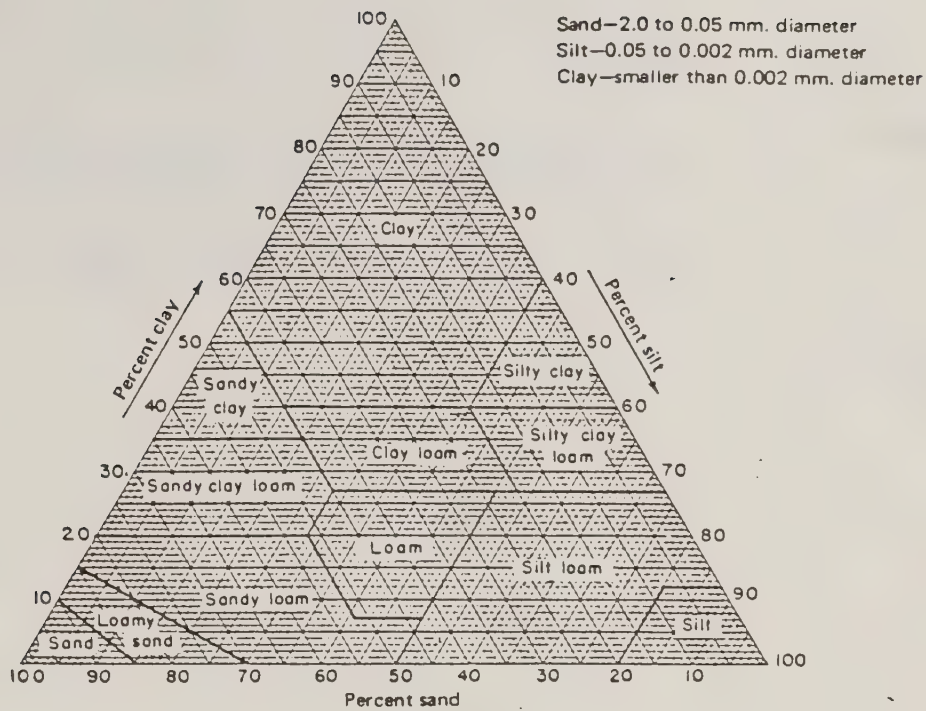
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GLOSSARY

Alluvial	Pertaining to material or processes associated with transportation or deposition by running water.
Alluvial Fan	A body of alluvium whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a plain.
Alluvium	Unconsolidated material deposited on land by running water including gravel, and silt clay and various mixtures of these.
Bedrock	The solid rock which underlies the soil and other unconsolidated material or that is exposed at the surface.
Bench	A nearly level to gently inclined erosional surface developed on resistant strata occurring along valley sides.
Boulder	Rock fragment greater than 60 cm (24 in) in diameter.
Clay	A soil separate consisting of particles less than .002 mm in diameter. A soil textural class containing large amounts of clay with smaller amounts of sand and silt.
Coarse Fragment	Rock or mineral fragment having a diameter of 2 mm or more; gravel, cobbles, stones and boulders.
Cobble	Rounded or partly rounded fragment of rock 7.5 to 25 cm (3 to 10 in) in diameter.
Colluvium	A general term applied to loose deposits of rock and soil at the base of cliffs or the bottom of hills that was deposited mainly by gravitational forces.
Compact till	Glacial drift deposited beneath a moving glacier, commonly clay rich, characterized by an extremely dense structure. Well-fitted till has less of a dense structure in place. This soil will restrict the movement of water through it relative to the degree of compaction.
Entisols	Youthful soils characterized as having no natural genetic horizons or at best only the beginnings of such.
E.U.C.	Stands for "Estimated Unified Classification System" - A soil classification system used by engineers for projects that use the structural properties of soils.
Fibric soil material (peat)	The least decomposed of all organic soil material. Fibric peat contains at least two-thirds of the volume of well preserved fiber that is readily identifiable according to botanical origin.

Forb	Any herbaceous plant that is not a grass or a sedge.
Flood plain	A nearly level alluvial plain which borders a stream and is subject to inundation under flood-stage conditions. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.
Glacial till	Nonsorted and nonstratified glacial drift; generally unconsolidated glacial drift which has been transported and deposited directly by the ice without subsequent reworking by water from the glacier, and consisting of a heterogeneous mixture of clay through boulder size particles.
Gravel	Rounded or angular fragments of rock 2mm to 7.5 cm (3 in) in diameter. An individual piece is a pebble.
Hemic soil material	Organic soil material intermediate in degree of decomposition between the less decomposed fibric and more decomposed sapric material. It generally has between one-third and two-thirds fiber content by volume, unrubbed.
Horizon, soil	A layer of soil approximately parallel to the land surface, having distinct characteristics produced by soil forming processes and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics.
Inceptisols	Soils that are beginning to show development of genetic horizons. They lack evidence of extreme weathering and are not sufficiently developed to be classified in one of the other seven orders.
Loess	Fine-grained wind-deposited material, dominantly of silt-size.
Moraine	An accumulation of soil and rock material, built chiefly by the direct action of glacial ice, which has an initial topographic expression of its own that is independent of control by the surface on which it lies.
Muskeg	A common name applied to meadows of the generally timbered country which have very poorly drained organic soils derived from a sphagnum, sedge, grass and/or herbaceous plants. Often a few slow growing, poorly formed black spruce or mountain hemlock with heath shrubs, willows, and dwarf birches are scattered on the drier sites.
Organic mat	The organic horizons that occur on the surface of the mineral soil.

Outwash plain	An extensive lowland area of mainly sandy or coarse textured glacial outwash deposited by meltwater streams beyond the active glacial ice. An outwash plain is commonly smooth but where pitted, it is generally low in relief.
Pedon	The smallest volume that can be called a soil. It can be described and sampled to represent the nature and arrangement of horizons, variability and other properties that are preserved in the samples. It extends downward to the depth of roots and ranges from one to 10 square meters in size.
Profile, soil	A vertical section of the soil through all its horizons and extending into the parent material.
Sand	A soil separate consisting of particles between .05 and 2.0 mm in diameter. A soil texture containing almost all sand with very little silt and/or clay.
Sapric	Organic soils with less than one-third fiber content by volume, unrubbed.
Silt	A soil separate consisting of particles between .002 to .05 mm in diameter. A soil textural class containing almost all silt with very little clay and/or sand.
Soil Depth	Deep: Soil which is greater than 100 cm (39 in) in depth. Moderately deep: Soil which is between 50 to 100 cm (20 to 39 in) in depth. Shallow: Soil which is less than 50 cm (20 in) in depth.
Soil Separates	Mineral particles less than 2 mm in diameter, ranging between the following names and size limits: <ul style="list-style-type: none"> Sand - .05 to 2.0 mm <ul style="list-style-type: none"> Very coarse sand - 1.0 to 2.0 mm Coarse sand - 0.5 to 1.0 mm Medium sand - .25 to 5 mm Fine sand - .10 to .25 mm Very fine sand - .05 to .10 mm Silt - .002 to .05 mm Clay - less than .002 mm
Soil Texture	The relative proportions of the various soil separates (sand, silt and clay) as described by the classes of soil texture. The limits of the various classes and subclasses are described in the following textural triangle.



SOIL TEXTURAL TRIANGLE

Solum	The upper and most weathered part of the soil profile in which the processes of soil formation are active; the A and B horizons.
Spodosol	Soils found primarily in cool and humid forests. They contain an illuvial subsurface horizon in which amorphous organic matter and aluminum with or without iron have accumulated.
Subsoil	Technically, the soil comprising the B horizon; roughly, the part of the solum below the surface soil.
Substratum	The part of the soil below the solum.
Stones	Rock fragments 25 to 60 cm (10 to 24 in) in diameter.
Stratified	Arranged in or composed of layers or strata. The term refers to geologic material. Layers in soil that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.
Talus	Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Terrace	A former alluvial plain, usually narrow and flat or undulating, which borders a valley floor or shoreline. The surface may be step-like representing the former position of an alluvial plain. A stream terrace, in contrast with a flood plain, is seldom subject to overflow.
V-shaped valley	The characteristic cross sectional appearance of a youthful valley after it has been down cut by running water.
Water table	The upper limit of the soil or underlying rock material that is wholly saturated with water.
Well-fitted glacial till	(See compact till).

APPENDIX A

SOIL DESCRIPTIONS

TYPIC CRYOFLUVENTS, LOAMY-SKELETAL, MIXED, NONACID

Soil Number: 7

Summary Description: These soils are deep, well drained, and form in alluvium consisting of stratified sands, silts, and gravels. They are located on second level terraces near streams with relatively low gradients. Slopes range from 0 to 15%. The mean annual temperature is about 34 F and the mean annual precipitation is about 45 in.

Sample Pedon Description:

- | | | |
|----|--------------------------|--|
| Oi | 10-0 cm
(4-0 in.) | Living moss, needles and roots |
| E | 0-8 cm
(0-3 in.) | Dark, grayish brown (2.5YR 4/2) loam; weak, fine granular structure; friable, slightly sticky, slightly plastic consistency; very strongly acid (pH 4.6); abrupt, smooth boundary |
| C1 | 8-18 cm
(3-7 in.) | Very dark gray (5YR 3/1) sand; single grain structure; loose, non-sticky, non-plastic consistency; strongly acid (pH 5.4); smooth boundary |
| C2 | 18-22 cm
(7-9 in.) | Dark, grayish brown (2.5YR 4/2) very gravelly silt loam; massive; friable, slightly sticky, non-plastic consistency; medium acid (pH 5.8); 30 percent gravel; medium acid (pH 5.8); abrupt, smooth boundary; organic debris throughout horizon |
| C3 | 22-38 cm
(9-15 in.) | Olive gray (5YR 4/2) very fine sandy loam; single grain structure; very friable, slightly sticky, slightly plastic consistency; strongly acid (pH 5.5); clear, smooth boundary |
| C4 | 38-50 cm
(15-20 in.) | Dark brown (10YR 3/3) loam; massive structure; very friable, slightly sticky, slightly plastic consistency; medium acid (pH 6.0); clear, smooth boundary |
| C5 | 50-100 cm
(20-39 in.) | Dark olive gray (5YR 3/2) very gravelly sandy loam; massive structure; loose, non-sticky, non-plastic consistency; slightly acid (pH 6.2); 50% gravel and 10% cobbles. |

Sample Location: Russian River Campground on second level terraces below camp unit #14.

Range in Characteristics:

O Horizon Depth: 8-15 cm (3-6 in.)

Soil Number: 7--Continued

E Horizon Color: Hue 2.5YR-7.5YR, Value 3-4, Chroma 2-3
 Thickness: 8-10 cm (3-4 in.)
 Texture: loam to silt loam

C Horizon Color: Hue 2.5YR-10YR, Value 3-4, Chroma 1-3
 Texture: Sandy loam, loam, silt loam
 Coarse Fragments: 0-60% per horizon
 Stratified layers of sand and gravels

TYPIC CRYORTHODS, SANDY-SKELETAL, MIXED
YAKUTAT SERIES, DRY PHASE

Soil Number: 14

Summary Description: These soils are deep, well drained, and form in alluvial gravels and sands overlain with windblown loess. They are located on alluvial terraces. Slopes range from 0 to 45%. The mean annual temperature is about 33 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

- | | | |
|-----|--------------------------|--|
| Oi | 5-0 cm
(2-0 in.) | Moss, leaves, roots, etc. |
| A | 0-6 cm
(0-2.5 in.) | Very dark, grayish brown (10YR 3/2) loam; weak, very fine granular structure; friable, nonsticky, nonplastic consistency, less than 5% gravel, extremely acid pH 4.5); abrupt wavy boundary |
| E | 6-12 cm
(2.5-5 in.) | Weak red (2.5YR 5/2) gravelly silt loam; weak, medium subangular-blocky structure; friable, slightly sticky, slightly plastic consistency; 15% gravel; extremely acid (pH 4.5); abrupt wavy boundary |
| Bs1 | 12-23 cm
(5-9 in.) | Dark brown (2.5YR 3/4) very gravelly sandy loam; weak, very fine granular structure; very friable, nonsticky, nonplastic consistency; 25% gravel and cobbles; medium acid (pH 5.7); clear wavy boundary |
| Bs2 | 23-34 cm
(9-13 in.) | Dark brown (7.5YR 3/4) very gravelly, coarse, sandy loam; weak, very fine granular structure; very friable, nonsticky, nonplastic consistency; 50% gravel and cobbles; medium acid (pH 6.0); clear wavy boundary |
| B3 | 34-44 cm
(13-17 in.) | Dark brown (10YR 3/3) very gravelly, loamy, coarse sand; single grain; loose, nonsticky, nonplastic consistency; 55% gravel and cobbles; medium acid (pH 6.0); gradual wavy boundary |
| C1 | 44-100 cm
(17-39 in.) | Very dark, grayish brown (10YR 3/2) coarse sand; single grain; loose, nonsticky, nonplastic consistency; 70% gravel and cobbles; slightly acid (pH 6.1); |

Sample Location: About 100 yards up the closed loop at the end of the second loop in Trail River Campground.

Range in Characteristics:

O Horizon Depth: 5-8 cm (3-4 in.)

Soil Number: 14--Continued

- A Horizon Color: Hue 5YR-10YR, Value 2.5-3, Chroma 2
 Thickness: 5-6 cm (2-2 1/2 in.)
 Texture: Loam to a fine sandy loam
 Remarks: Not always present
- E Horizon Color: Hue 2.5YR-10YR, Value 4-5, Chroma 1-2
 Thickness: 2-8 cm (1-3 in.)
 Texture: Silt loam to loamy fine sand
 Coarse Fragments: 5-15% rounded gravel & cobbles
- B Horizon Color: Hue 2.5YR-10YR, Value 2.5-4, Chroma 2-6
 Thickness: 22-34 cm (9-13 in.)
 Texture: Sandy loam, loam, coarse sandy loam
 Coarse Fragments: 20-50% rounded gravel & cobbles
- C Horizon Color: HUE 5YR-10YR, Value 3-4, Chroma 1-2
 Texture: Loamy sand to coarse sand
 Coarse fragments: 40-70% rounded gravel & cobble

TYPIC CRYORTHODS, SANDY-SKELETAL, MIXED

Soil Number: 15

Summary Description: These soils are deep, well drained, and form in glacial ablation till. They are found in kame fields that are normally located in valley bottoms. Slopes range from 25 to 45%. The mean annual temperature is about 29 F. The mean annual precipitation is about 45 in.

Sample Pedon Description:

- | | | |
|----|--------------------------|--|
| Oi | 11-8 cm
(4-3 in.) | Grass, alder, leaves, and moss. |
| Oa | 8-0 cm
(3-0 in.) | Dead grass, roots and decomposed organic matter |
| E | 0-6 cm
(0-2.5 in.) | Brown (10YR 5/3) very fine, sandy loam; weak, very fine fine granular structure; very friable consistency; 25% gravel and cobbles; many very fine and common fine roots; extremely acid (pH 4.5); abrupt wavy boundary |
| B1 | 6-11 cm
(2.5-5 in.) | Dusky red (2.5YR 3/2) loam, moderate, very fine granular structure; very friable consistency; 30% gravel and 50% cobbles; many very fine, common fine roots; extremely acid (pH 4.5); gradual wavy boundary |
| B2 | 11-25 cm
(5-10 in.) | Reddish brown (5YR 4/4) sandy loam; strong, very fine granular structure; very friable consistency; 35% gravel and 50% cobbles; many very fine and common fine roots; extremely acid (pH 4.5); gradual irregular boundary |
| B3 | 25-52 cm
(10-21 in.) | Yellowish red (5YR 4/6) very gravelly, coarse sandy loam; weak, very fine subangular blocky structure; very friable consistency; 20% cobbles; common very fine and common fine roots; medium acid (pH 6.0); gradual irregular boundary |
| C1 | 52-80 cm
(17-39 in.) | Dark brown (7.5YR 3/2) loamy coarse sand; loose structure; loose consistency; 70% gravel and 20% cobbles; few very fine roots; slightly acid (pH 6.2); gradual wavy boundary. |
| C2 | 80-120 cm
(17-39 in.) | Grayish brown (2.5YR 5/2) loamy sand; massive; loose consistency; 80% gravel and 10% cobbles and stones; slightly acid (pH 6.5). |

Sample Location: A road cut in a kame on the west side of the Palmer Creek road about 150 yards before the parking lot at the end of the road.

Soil Number: 15--Continued

Range in Characteristics:

- | | |
|------------|---|
| O Horizon | Thickness: 8-11 cm (3-4 in.) |
| E Horizon | Color: Hue 5YR-10YR, Value 4-5, Chroma 2-3
Thickness: 2-6 cm (1-3 in.)
Texture: Silt loam, very fine sandy loam, and loam
Coarse Fragments: 5-25% gravel and cobbles. |
| Bs Horizon | Color: 2.5YR-10YR, Value 2.5-4,, Chroma 2-6
Thickness: 21-44 cm (8-18.5 in.)
Texture: Coarse sandy loam, sandy loam, and loam
Coarse Fragments: 20-85% gravel and cobbles. |
| C Horizon | Color: 2.5YR-7.5YR, Value 3-5, Chroma 1-2
Texture: Loamy coarse sand to loamy sand
Coarse Fragments: 70-90% gravel and cobbles |

TYPIC CRYAQUENTS, SANDY-SKELETAL, MIXED

Soil Number: 16

Summary Description: These soils are deep, poorly drained, and form in alluvial gravels and sands. They are located near seeps and on stable, gravelly floodplains with high water tables. Slopes range from 0 to 25%. The mean annual temperature is about 34 F. The mean annual precipitation is about 50 in.

Sample Pedon Description:

- Oi 9-0 cm Moss roots and moss
(4-0 in.)
- C1 0-15 cm Very dark gray (10YR 3/1) coarse sand; single grain
(0-6 in.) structure; loose, nonsticky, nonplastic consistency; 70% rounded gravel, 5% cobbles; neutral (pH 7.2); clear wavy boundary
- C2 15-30 cm Dark gray (10YR 4/1) very gravelly, loamy sand; dark
(6-12 in.) yellowish brown (10YR 4/6) common, medium distinct mottles; single grain structure; loose, nonsticky. nonplastic consistency; 50% gravel, 5% cobbles; mildly alkaline (pH 7.5); clear wavy boundary
- C3 30-64 cm Very dark gray (10YR 3/1) very gravelly, loamy sand;
(12-25 in.) single grain structure; loose, nonsticky, nonplastic consistency; 50% rounded gravel, 5% cobbles; mildly alkaline (pH 7.8)

Sample Location: Alder floodplain 100 ft west from Daves Creek bridge on entrance to Tern Lake Campground.

Range in Characteristics:

- Oi Horizon Thickness: 7-10 cm (3-4 in.)
- C Horizon Thickness: 64 cm plus (25 in. plus)
Color: Hue 10YR, Value 3-4, Chroma 1-2
Depth of Mottles: 15-30 cm (6-12 in.)
Color of Mottles: 10YR 4/6
Texture: Coarse sand to loamy sand.
Coarse Fragment: 50-75% rounded gravel.
Depth to Water Table: 28 cm

TYPIC CRYORTHENTS, SANDY-SKELETAL, MIXED
CHENEGA SERIES, DRY PHASE

Soil Number: 19

Summary Description: These soils are deep, somewhat excessively drained, and form in alluvial sands and gravels. They are located on river terraces with relatively high gradient streams. Slopes range from 0 to 45%. The mean annual precipitation is about 50 in. The mean annual temperature is about 31 F.

Sample Pedon Description:

- | | | |
|----|--------------------------|---|
| 0i | 13-0 cm
(5-0 in.) | Fibric material; composed of mosses, leaves, and sticks |
| A | 0-13 cm
(0-5 in.) | Very dark, grayish brown (10YR 3/2) fine sandy loam; moderated, medium granular structure; friable, slightly sticky, nonplastic consistency; strongly acid (pH-5.4); abrupt smooth boundary |
| C1 | 13-20 cm
(5-8 in.) | Very dark gray (10YR 3/1) very gravelly, coarse sand; single grain; loose, non-sticky, non-plastic consistency; 40% gravel; medium acid (pH-5.6); abrupt smooth boundary |
| C2 | 20-30 cm
(8-12 in.) | Very dark gray (10YR 3/1) sandy loam; single grain; friable, slightly sticky, nonplastic consistency; strongly acid (pH-5.5); abrupt smooth boundary |
| C3 | 30-41 cm
(12-16 in.) | Very dark gray (10YR 3/1) extremely gravelly, coarse sand; single grain; loose, nonsticky, nonplastic consistency; 10% gravel; 70% cobbles; medium acid (pH-5.8); clear smooth boundary |
| C4 | 41-101 cm
(16-40 in.) | Very dark gray (10YR 3/1) extremely gravelly, coarse sand; single grain; loose, nonsticky, nonplastic consistency; 60% gravel; 10% cobbles; medium acid (pH-5.8) |

Sample Location: About 100 yds on the west side of the Hope road approximately 1.6 miles north from the Hope turnoff on the Seward Highway in the NW 1/4, Section 10, T8N, R1W

Range in Characteristics:

- | | |
|-----------|---|
| O Horizon | Thickness: 8-13 cm (3-5 in.) |
| A Horizon | Color: Hue 10YR-5YR, Value 3-2.5, Chroma 2
Thickness: 4-16 cm (4-5 in.)
Texture: Silt loam to a fine sandy loam
Coarse Fragments: None to 10% gravel and 25% cobbles |

Soil Number: 19--Continued

C Horizon Color: Hue 10YR-5Y, Value 3-5, Chroma 1-3
 Thickness: 84 cm and greater
 Texture: Coarse sand to a sandy loam
 Coarse Fragments: 10-60% gravel, 10-70% cobbles.
 Remarks: Some strata may not have coarse fragments.

TYPIC CRYUMBREPTS, LOAMY-SKELETAL, MIXED

Soil Number: 20

Summary Description: These soils are moderately deep, somewhat poorly drained, and form in alluvial and colluvial deposits. They are located in alpine terraces and toe slopes above timberline. Slopes range from 0 to 45%. The mean annual precipitation is about 30 in. The mean annual temperature is about 30 F.

Sample Pedon Description:

- | | | |
|----|-------------------------|---|
| 0i | 9-0 cm
(4-0 in.) | Fibric material; composed of leaves, matted grass, living roots and grass |
| A | 0-22 cm
(0-9 in.) | Dark brown (7.5YR 3/2) loam; strong fine granular structure; very friable, slightly sticky and slightly plastic consistency; 10% gravel and 15% cobbles by volume; slightly acid (pH 6.4); gradual wavy boundary |
| 2B | 22-50 cm
(9-20 in.) | Dark brown (10YR 3/3) gravelly loam; weak medium subangular blocky to moderate fine granular structure; very friable, slightly sticky and nonplastic consistency; 20% gravel and 5% stones by volume, neutral (pH 6.6); clear wavy boundary |
| 2C | 50-92 cm
(20-36 in.) | Olive brown (2.5Y 4/4) sandy loam; massive; friable nonsticky and nonplastic consistency; 20% gravel, 10% cobbles and 15% stones by volume; neutral (pH 6.8) |

Sample Location: About 100 yards west of the Hope Road approximately three miles north of the Seward Highway intersection in the SE 1/4, Section 34, T9N, R1W.

Range in Characteristics:

- | | |
|------------|--|
| 0 Horizon | Thickness: 7-9 cm (3-4 in.) |
| A Horizon | Color: Hue 5YR-10YR, Value 3-5 Chroma 2
Thickness: 8-22 cm (3-9 in.)
Texture: Loam-Silt Loam
Coarse Fragments: 0-45% |
| 2B Horizon | Color: Hue 5Y-10YR, Value 3-4, Chroma 2-4
Thickness: 18-28 cm (7-11 in.)
Texture: Silt loam - loam
Coarse Fragments: 25-70% |
| 2C Horizon | Color: Hue 2.5Y-10YR, Value 4, Chroma 3-4
Texture: Silt loam to sandy loam
Coarse Fragments: 45% |

TYPIC CRYORTHODS, MEDIAL-SKELETAL, MIXED

Soil Number: 24 (Turnagain Series)

Summary Description: These soils are deep, well drained, and form in glacial till, or mixed outwash and till that has been overlain with windblown loess. They are located on glaciated sideslopes, footslopes, hills, and in valley bottoms that are covered with ablation till. Slopes range from 0 to greater than 65%. The mean annual temperature is about 31 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

- | | | |
|-----|--------------------------|---|
| Oi | 5-0 cm
(2-0 in.) | Moss, spruce needles and sticks |
| E | 0-6 cm
(0-2 in.) | Brown(7.5YR 4/2) sandy loam; weak, medium granular structure; very friable consistency; common medium and many fine roots; very strongly acid (pH 4.8); abrupt smooth boundary |
| Bs1 | 6-17 cm
(2-7 in.) | Very dusky red (2.5YR 2.5/3) sandy loam; weak, fine subangular blocky breaking to weak, fine granular structure; very friable consistency; 15% gravel; common medium and fine roots; strongly acid (pH 5.2); abrupt smooth boundary |
| Bs2 | 17-32 cm
(7-13 in.) | Dark brown (10YR 3/3) sandy loam; weak, fine granular structure; very friable consistency; 30% gravel; few medium and fine roots; strongly acid (pH 5.4); abrupt smooth boundary |
| BC | 32-49 cm
(13-22 in.) | Brown (10YR 4/3) sandy loam; massive; very friable consistency; 10% gravel and 30% cobbles; strongly acid (pH 5.5); abrupt smooth boundary |
| 2C | 49-150 cm
(22-59 in.) | Dark grayish brown (2.5Y 4/2) sandy loam; massive; friable; 10% gravel and 35% cobble; medium acid (pH 6.0) |

Sample Location: In a stand of birch trees about 400 yards up Resurrection Creek from Bedrock Creek on top of the west river cut slope.

Range in Characteristics:

- | | |
|-----------|---|
| O Horizon | Depth: 5-16 cm (2-6 in.) |
| E Horizon | Color: Hue 7.5YR-2.5YR, Value 4-5, Chroma 0-2
Thickness: 3-12 cm (1-5 in.)
Texture: Sandy loam to silt loam
Coarse Fragments: 0-30% gravel and cobbles |

Soil Number: 24-- Continued

Bs Horizon Color: Hue 2.5YR-10YR, Value 2-4, Chroma 2-4
 Thickness: 21-58 cm (8-21 in.)
 Texture: Sandy loam to silt loam
 Coarse Fragments: 15-40% gravel and cobbles
 Remarks: Lower B Horizon grades into a glacial till

2C Horizon Color: Hue 10YR-2.5Y, Value 3-4, Chroma 2-4
 Texture: Sandy loam to silt loam
 Coarse Fragments: 40-75% gravel and cobbles
 Remarks: Glacial till intermittently compact

LITHIC CRYOCHREPTS, LOAMY-SKELETAL, MIXED

Soil Number: 25

Summary Description: These soils are shallow, well drained, and form where thin deposits of glacial till, overlain with windblown loess, cover bedrock. They are located on hill crests in undulating topography or on sideslopes near cliffs. The slopes range from 45 to 70%. The mean annual temperature is about 31 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

Oi	6-3 cm (2-1 in.)	Leaves, roots and moss
Oa	3-0 cm (1-0 in.)	Decomposed Organic material
A	0-6 cm (0-2 in.)	Black (5YR 2.5/1) loamy fine sand; moderate, very fine granular structure; very friable, nonsticky and nonplastic consistency; 5% gravel by volume; extremely acid (pH 4.2); clear wavy boundary
B	6-15 cm (2-6 in.)	Very dark, grayish brown (10YR 3/2) fine sandy loam; moderate fine granular structure; very friable, slightly sticky and nonplastic consistency; 40% gravel and 10% cobble; very strongly acid (pH 4.5); abrupt irregular boundary
R	15 cm (6 in.)	Bedrock; slate, shale or greywacke

Sample Location: About 100 yds upslope on the west side of the Hope road one-half mile from the Hope-Y turnoff.

Range in Characteristics:

O Horizon	Depth: Usually less than 6 cm (2 in.)
A Horizon	Color: Hue 5YR-10YR, Value 2-3, Chroma 1-3 Thickness: 6-17 cm (2-7 in.) Texture: Silt loam to loamy fine sand Coarse Fragments: 5-40% gravel and cobbles
B Horizon	Color: Hue 2.5YR-10YR, Value 2.5-3, Chroma 2 Thickness: 9-18 cm (4-7 in.) Texture: Fine sandy loam to loam Coarse Fragments: 50% gravel and cobbles
C Horizon	In some profiles there is a C Horizon

HISTIC CRYAQUEPTS, LOAMY-SKELETAL, MIXED

Soil Number: 29

Summary Description: These soils are moderately deep, poorly drained, and form in glacial till. They are located around seep areas on footslopes and valley bottoms directly below seeps. Slopes range from 0 to 25%. The mean annual temperature is about 31 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

- | | | |
|----|-------------------------|---|
| Oi | 33-25 cm
(13-10 in.) | Moss, roots, sticks, & spruce needles |
| Oa | 25-0 cm
(10-0 in.) | Very dark brown (10YR 2/2) muck; strongly acid (pH 4.6); clear wavy boundary |
| E | 0-5 cm
(0-2 in.) | Gray (10YR 5/1) silt loam; massive; friable consistency; 10% gravel; medium acid (pH 6.0); irregular wavy boundary, ash influenced loess |
| 2B | 5-15 cm
(2-6 in.) | Dark brown (7.5YR 4/4) silt loam; common, medium, distinct brown (10YR 5/3) mottles; weak fine to medium subangular blocky structure; friable consistency; 30% gravel and 5% cobbles; medium acid (pH 6.0); clear wavy boundary, glacial till |
| 2C | 15-35 cm
(6-14 in.) | Brown (10YR 5/2) silt; massive very friable, consistency; 35% gravel and 5% cobbles; medium acid (pH 6.0) |
| | 35 cm
(14 in.) | Water table |

Sample Location: 100 feet north of the road at about mile 16 of the Hope Highway

Range in Characteristics:

- | | |
|------------|---|
| O Horizon | Thickness: Up to 33 cm |
| E Horizon | Color: Hue 7.5YR-10YR, Value 3-5, Chroma 1-2
Thickness: 5-13 cm (2-5 in.)
Texture: Silt loam
Coarse Fragments: 10-25% gravel |
| 2B Horizon | Color: Hue 7.5YR-10YR, Value 3-4, Chroma 2-4
Thickness: 7-10 cm (3-4 in.)
Texture: Silt loam
Coarse Fragments: 15-35% gravel |

Soil Number: 29--Continued

2C Horizon Color: Hue 10YR, Value 3-6, Chroma 2-5
 Texture: Silt to sandy loam
 Coarse Fragments: 40-80% gravel

DYSTRIC CRYOCHREPTS, LOAMY-SKELETAL, MIXED

Soil Number: 34

Summary Description: These soils are deep, well drained, and form in alluvial sands and gravels. They are located in terraces, fans and the river-cut sideslopes of terraces. The slopes range from 25 to 65%. The mean annual temperature is about 30 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

- | | | |
|-----|--------------------------|---|
| Oi | 8-0 cm
(3-0 in.) | Living Moss, roots, twigs, etc. |
| A | 0-4 cm
(0-2 in.) | Dark brown (7.5YR 3/2) gravelly silt loam; weak medium subangular blocky breaking to weak coarse granular structure; friable, slightly sticky, slightly plastic consistency; very strongly acid (pH 4.6); 10% gravel, 10% cobbles; abrupt wavy boundary |
| B21 | 4-26 cm
(2-10 in.) | Dark brown (7.5YR 3/4) loam; moderate medium granular structure; very friable, slightly sticky, slightly plastic consistency; very strongly acid (pH 4.8); 30% gravel and 20% cobbles; abrupt irregular boundary |
| B22 | 26-45cm
(10-18 in.) | Dark brown (10YR 3/3) silt loam; weak and moderate, medium granular structure; very friable, slightly sticky, slightly plastic consistency; medium acid (pH 6.0); abrupt irregular boundary |
| C1 | 45-86 cm
(18-34 in.) | Dark grayish brown (2.5Y 4/2) loam; weak medium granular friable, slightly sticky, slightly plastic consistency; medium acid (pH 6.0); 10% gravels, 50% cobbles, 10% stones; clear irregular boundary |
| C2 | 86-110 cm
(34-44 in.) | Dark olive gray (5Y 3/2) coarse sand; single grain loose, nonsticky, nonplastic consistency; slightly acid (pH 6.2); 50% fine and regular gravel, 10% cobbles. |

Sample Location: Tern Lake Campground. About 1/3 mile southeast of main parking lot in last stand of spruce trees before the open area cleared by avalanches.

Range in Characteristics:

- | | |
|-----------|--|
| O Horizon | Thickness: 5-8 cm (2-3 in.) |
| A Horizon | Color: Hue 5YR-7YR, Value 2-4, Chroma 2-3
Thickness: 3-12 cm (1-5 in.)
Texture: Silt loam
Coarse Fragments: 0-20% |

Soil Number: 34--Continued

- B Horizon Color: Hue 5YR-10YR, Value 3-4, Chroma 3-4
 Thickness: 40-56 cm (16-22 in.)
 Texture: Silt loam to loam
 Coarse Fragments: 0-50%
- C Horizon Color: Hue 2.5Y-5YR, Value 3-5, Chroma 2-4
 Texture: variable silt loam, loam, loamy sand, coarse sand
 Coarse Fragments: 45-70%
 Remarks: There may be discontinuous strata of sands or
 silt in between the gravel.

TERRIC BOROSAPRISTS, LOAMY-SKELETAL, MIXED, EUIC

Soil Number: 36

Summary Description: These soils are deep, very poorly drained, and form lacustrine silt or glacial tills. They are located in depressions on terraces in the valley bottoms that are lined with glacial till or lacustrine silt. The slope ranges from 0 to 15%. The mean annual temperature is about 30 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

- | | | |
|-----|--------------------------|--|
| Oi | 0-10 cm
(0-4 in.) | Moss, matted grass, and live roots |
| C1 | 10-18 cm
(4-7 in.) | Gray (5YR 5/1) loam; weak medium subangular blocky structure; friable; nonsticky and slightly plastic consistency; medium acid (pH 3.8); abrupt irregular boundary |
| Oa1 | 18-54 cm
(7-21 in.) | Black (5YR 2.5/1) broken faces and very dark brown (10YR 2/2) when pressed, muck; about 30% fibers, 10% when rubbed; medium acid (pH 5.8); abrupt wavy boundary |
| Oa2 | 54-67 cm
(21-26 in.) | Black (7.5YR 2/1) broken and pressed muck; about 5 percent fibers, none when rubbed; medium acid (pH 5.6); abrupt wavy boundary |
| C2 | 67-100 cm
(21-16 in.) | Dark gray (N 4/0) clay loam; massive; firm, sticky and plastic consistency; 40% gravel, 15% cobbles and 5% stones by volume strongly acid (pH 5.4) |

Sample Location: Just off the west side of the Crow Pass road about three quarters of a mile before the first bridge.

Range in Characteristics:

- | | |
|------------|---|
| Oi Horizon | Moss, horsetail and grass |
| Oa Horizon | Color: Hue 5YR-10YR, Value 2-2.5, Chroma 1-2, (broken, pressed & rubbed)
Thickness: 22-49 cm (9-19 in.) |
| C Horizon | Color: Hue N, 10YR-5YR, Value 3-5, Hue 0-2
Texture: Loamy sand, sandy clay loam, clay loam, loam
Coarse Fragments: 45-60% gravel and cobbles
Remarks: There may be loamy ash layers in the organic horizons that are up to 8 cm thick. |

LITHIC CRYORTHODS, LOAMY-SKELETAL, MIXED

Soil Number: 48

Summary Description: These soils are deep, moderately well drained, and form in weathered colluvium and glacial till overlain with windblown loess. They are located on irregular sideslopes and ridge-crests near bedrock outcrops. The slope ranges from 9 to 70%. The mean annual temperature is about 29 F. The mean annual precipitation is about 40 in.

Sample Pedon Description:

Oi	5-0 cm (2-0 in.)	Moss and leaves grass
Ai	0-5 cm (0-2 in.)	Dark brown (10YR 3/3) silt loam; weak, fine granular structure; friable consistency; abrupt smooth boundary; volcanic ash influenced loess
E	5-8 cm (2-3 in.)	Light gray (10YR 6/1) silt loam; weak fine granular structure; very friable consistency; 5% gravel; abrupt smooth boundary
Bs	8-40 cm (3-16 in.)	Dark reddish brown (5YR 3/4) loam; weak fine granular structure; friable consistency; 40% gravel and 5% cobbles; abrupt irregular boundary
R	40 cm (16 in.)	Bedrock; Graywacke and metasandstone

Sample Location: About 1/4 mile up trail on north side of Victor Creek near south end of Kenai Lake.

Range in Characteristics:

O Horizon	Thickness: 5-7 cm (2-3 in.)
A Horizon	Color: Hue 10YR, Value 2-3, Chroma 2-3 Thickness: 5-7 cm (2-3 in) Texture: Silt loam
E Horizon	Color: Hue 10YR, Value 4-6, Chroma 1 Thickness: 2-5 cm (1-2 in) Texture: Silt loam to loam Coarse Fragments: 5-30% gravel and cobbles
B Horizon	Color: Hue 5YR-10YR, Value 3-4, Chroma 3-4 Thickness: 26-49 cm (11-19 in.) Texture: Loam to loamy sand Coarse Fragments: 10-45% gravel and cobbles

Soil Number: 48--Continued

C Horizon Color: Hue 2.5YR-5Y, Value 5, Chroma 2-4
 Thickness: 12 cm (5 in.)
 Texture: Sandy-clay loam
 Coarse Fragments: 55% gravel and cobbles
 Remarks: Not always present

R Horizon Bedrock: Shale, slate and greywacke

TYPIC CRYAQUENTS, COARSE-LOAMY OVER SANDY-SKELETAL, MIXED

Soil Number: 50

Summary Description: These soils are deep, somewhat poorly drained, and form in alluvial silts, sands, and gravels. They are located in first level terraces, floodplains and valley bottoms with a high water table or that are subject to frequent flooding. The slope ranges from 0 to 15%. The mean annual temperature is about 29 F. The mean annual precipitation is about 20 in.

Sample Pedon Description:

- | | | |
|-----|-------------------------|---|
| Oi | 12-8 cm
(5-3 in.) | Leaves, grass, sticks |
| Oa | 8-0 cm
(3-0 in.) | Very dark gray (5YR 3/1) muck |
| A | 0-20 cm
(0-8 in.) | Dark brown (7.5YR 3/2) loamy very fine sand; massive; friable, non-sticky, non-plastic consistency; 10% gravel; common very fine, fine and medium roots; mildly alkaline (pH 7.8); clear wavy boundary |
| C1 | 20-36 cm
(8-14 in.) | Dark brown (7.5YR 3/2) fine sandy loam; moderate, medium granular structure; friable, non-sticky, slightly plastic consistency; 10% gravel; common very fine, fine and medium roots; mildly alkaline (pH 7.5); abrupt wavy boundary |
| 2C2 | 36-62 cm
(14-24 in.) | Dark grayish brown (2.5YR 4/2) coarse sand; single grain; loose consistency; 80% gravel and cobbles |
| 2C3 | 62 cm
(24 in.) | Water table |

Sample Location: Resurrection Creek on the first level terrace about two miles up stream from mouth.

Range in Characteristics:

Thickness of coarse loamy layer ranges from 15-75 cm

O Horizon Thickness: 10-12 cm (4-5 in.)

A Horizon Color: Hue 7.5-10YR, Value 3, Chroma 2-3
 Thickness: 7-20 cm (3-8 in.)
 Texture: Fine sandy loam, silt loam, loamy very fine sand
 Coarse Fragments: 10% gravel

Soil Number: 50--Continued

C Horizon Color: Hue 7.5 YR, Value 3, Chroma 2
 Thickness: 12-16 cm (5-7 in.)
 Texture: Fine sandy loam to loam
 Coarse Fragments: 10% gravel

2C Horizon Color: Hue 2.5-5YR, Value 4, Chroma 1
 Texture: Loamy sand to coarse sand
 Coarse Fragments: 55-90% gravel & cobble.
 Water Table: 40-75 cm (14-29 in.)

TYPIC CRYORTHODS, COARSE-LOAMY, MIXED

Soil Number: 51

Summary Description: These soils are deep, moderately well drained, and form in lacustrine or loess deposits on top of glacial till. They are located on terraces and old valley bottoms. The slopes range from 0 to 65%. The mean annual temperature is about 32 F. The mean annual precipitation is about 20 in.

Sample Pedon Description:

- | | | |
|-----|-------------------------|--|
| Oi | 9-0 cm
(4-0 in.) | Moss, leaves and twigs. |
| E | 0-1 cm
(0-5 in.) | Brown (7.5YR 5/4) silt loam; weak fine granular structure; loose consistency; many very fine, fine and medium roots; strongly acid (pH 5.2); abrupt broken boundry; volcanic ash influenced loess |
| Bs1 | 1-11 cm
(1.5-4 in.) | Dark brown (7.5YR 3/4) silt loam; weak fine granular structure; loose consistency; many fine and few medium roots; strongly acid (pH 5.2); clean wavy boundary |
| Bs2 | 11-26 cm
(4-11 in.) | Dark yellowish brown (10YR 4/6) silt loam; weak very fine granular structure; loose consistency; few fine roots; strongly acid (pH-5.2); clear wavy boundary |
| 2B3 | 26-40 cm
(11-16 in.) | Light olive brown (2.5YR 5/4) silty clay loam; weak, fine subangular blocky structure; friable consistency; 15% gravel; few very fine roots; strongly acid (pH 5.4); clear wavy boundary; glacial till |
| 2C | 40-75 cm
(16-30 in.) | Brown (10YR 5/3) silty clay loam; weak fine platy structure; very fine firm consistency; 20% gravel; strongly acid (pH 5.5); till is compact enough to pedon |

Sample Location: The pedon is located about 200 yards north of the ridge foot path, on the crest of the upper bench from Thompson's Canyon on the Resurrection Creek road.

Range in Characteristics:

- | | |
|-----------|---|
| O Horizon | Depth: 3-9 cm (1-4 in.) |
| E Horizon | Color: Hue 7.5YR-10YR, Value 5, Chroma 1-4
Thickness: 1-5 cm(2-3 in.)
Texture: Fine sandy loam to silt loam |

Soil Number: 51--Continued

B Horizon	Color: Hue 7.5YR-10YR, Value 2-4, Chroma 4-6 Thickness: 14-25 cm (6-10 in.) Texture: Sandy loam to silt loam Remarks: Volcanic ash influenced ash
2B3 Horizon	Color: Hue 2.5YR-5YR, Value 4-5, Chroma 2-4 Thickness: 10-19 cm (4-8 in.) Texture: Sandy loam to silty clay loam Coarse Fragments: 15-20% gravel and cobbles Remarks: Glacial till
2C Horizon	Color: Hue 10YR-5YR, Value 5-2.5, Chroma 2-3 Texture: Sandy loam to silty clay loam Coarse Fragments: 10-25% gravel Remarks: Glacial till

HISTIC CRYAQUEPTS, COARSE-SILTY, MIXED

Soil Number: 61

Summary Description: These soils are deep, somewhat poorly to poorly drained, and form in alluvial or lacustrine silts and clays. They are located in seep areas on footslopes. The slope ranges from 0 to 25%. The mean annual temperature is about 31 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

- | | | |
|----|-------------------------|---|
| 0i | 28-12 cm
(11-5 in.) | Low shrubs, sticks, roots, leaves |
| 0a | 12-0 cm
(5-0 in.) | Dark brown (7.5YR 3/2) decomposed muck |
| A | 0-10 cm
(0-4 in.) | Very dark, grayish brown (10YR 3/2) silt loam;
massive; friable consistency; strongly acid (pH 5.4);
clear wavy boundary |
| C1 | 10-28 cm
(4-11 in.) | Dark, grayish brown (10YR 4/2) silty clay loam;
massive; very firm consistency; medium acid (pH 5.6);
clear wavy boundary |
| C2 | 28-75 cm
(11-30 in.) | Dark, grayish brown (2.5YR 4/2) loam; massive
firm consistency; medium acid (pH 5.8) |

Sample Location: About 1/4 mile NW from the point where the Thompson Canyon trail reaches the upper terrace.

Range in Characteristics:

- | | |
|-----------|---|
| O Horizon | Thickness: 20 to 28 cm |
| A Horizon | Color: Hue 10YR-7.5YR, Value 2-4, Chroma 2-3
Thickness: 4-12 cm (2-5 in.)
Texture: Silt loam to fine sandy loam |
| C Horizon | Color: Hue 10YR-2.5YR, Value 4, Chroma 2
Texture: Silt loam, loam, silty clay loam |

PERGELIC CRYOCHREPTS, LOAMY-SKELETAL,MIXED

Soil Number: 62

Summary Description: These soils are deep, well drained, and form in glacial till overlain by windblown loess. They are located on gentle footslopes. The slope ranges from 9 to 25%. The mean annual temperature is about 31 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

- | | | |
|----|-------------------------|---|
| Oe | 25-0 cm
(11-0 in.) | Moss, spruce needles and sticks |
| A | 0-2.5 cm
(0-1 in.) | Very dark brown (10YR 2/2) silt loam; weak fine granular structure; friable consistency; strongly acid (pH 5.3); abrupt smooth boundary. |
| E | 2.5-15 cm
(6-12 in.) | Grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable consistency; strongly acid (pH 5.5); gradual smooth boundary |
| B1 | 15-46 cm
(6-18 in.) | Grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable consistency; 5% gravel and 5% cobbles; medium acid (pH 5.7); gradual wavy boundary. |
| B2 | 46-56 cm
(18-22 in.) | Dark, yellowish brown (10YR 3/4) silt loam; weak fine granular structure; friable consistency; 40% gravel and 10% cobbles; medium acid (pH 6.0). |

Sample Location: Between the Palmer Creek and Resurrection Creek Roads in the NW 1/4, Section 15, T9N R2W.

Range in Characteristics:

- | | |
|-----------|--|
| O Horizon | Thickness: 15-25 cm (6-10 in.) |
| A Horizon | Color: Hue 10YR, Value 2-3, Chroma 2-3
Thickness: 0-3 cm (0-1 in.)
Texture: Silt loam
Remarks: Not always present |
| E Horizon | Color: Hue 10YR, Value 4-5, Chroma 1-3
Thickness: 8-15 cm (3-6 in.)
Texture: Silt loam |
| B Horizon | Color: Hue 10YR, Value 3-5, Chroma 3-5
Texture: Silt loam
Coarse Fragments: 10 to 50% gravel and cobbles. |

DYSTRIC CRYOCHREPTS, LOAMY-SKELETAL, MIXED

Soil Number: 63

Summary Description: These soils are moderately deep, well drained, and form in glacial till that is somewhat compacted in places. They are located on sideslopes and avalanche slopes which contain deposits derived from glacial till. The slopes range from 0 to 65%. The mean annual temperature is about 30 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

- Oi 2-0 cm (1-0 in.) Matted grasses, dead forbs, sticks, leaves, moss and roots.
- A 0-14 cm (0-6 in.) Dark brown (10YR 3/3) loam; moderate medium subangular blocky structure; friable, non-sticky, slightly plastic consistency; 5% gravel and 45% cobbles; strongly acid (pH 5.4); gradual wavy boundary
- B1 14-30 cm (6-12 in.) Dark, yellowish brown (10YR 3/4) fine sandy loam; weak, medium subangular blocky structure; friable, nonsticky; slightly plastic consistency; 15% gravel and 5% cobbles; medium acid (pH 5.6); clear wavy boundary
- B2 30-42 cm (12-16 in.) Dark, yellowish brown (10YR 4/4) sandy loam; massive; friable, slightly sticky, slightly plastic consistency; 50% gravel and 10% cobbles; medium acid (pH 5.6); clear wavy boundary; compact till
- C 42-72 cm (16-28 in.) Olive gray (5YR 4/2) sandy loam; massive; friable, slightly sticky, slightly plastic consistency; 65% gravel and 10% cobbles; medium acid (pH 5.8)

Sample Location: Back side of the small hill 150 yards west of Turnagain Pass parking lot.

Range in Characteristics:

- O Horizon Thickness: 2-5 cm (1-2 in.)
- A Horizon Color: Hue 10YR, Value 3-4, Chroma 2-3
Thickness: 8-14 cm (3-6 in.)
Texture: Silt loam and loam
Coarse Fragments: 15-50%
- B Horizon Color: Hue 10YR, Value 3-5, Chroma 3-4
Thickness: 24-32 cm (10-13 in.)
Texture: Fine sandy loam to loam
Coarse Fragments: 20-60%

Soil Number: 63--Continued

C Horizon Color: Hue 2YR-5YR, Value 4, Chroma 1-2
 Texture: Sandy loam to loam
 Coarse Fragments: 50% - 75%

TYPIC CRYAQUENTS, LOAMY-SKELETAL, MIXED, NON-ACID

Soil Number: 64

Summary Description: These soils are deep, poorly to somewhat poorly drained, and form in lacustrine silts and clays. They are located in glacial outwash plains and river terraces in remnant valley bottoms. The slope ranges from 25 to 65%. The mean annual temperature is about 31 F. The mean annual precipitation is about 30 in.

Sample Pedon Description:

- Oi 5-0 cm Dead leaves and live roots
(0-10 in.)
- A 0-25 cm Very dark, grayish brown (10YR 3/2) sandy loam; weak,
(0-10 in.) fine granular structure; very friable, nonsticky,
nonplastic consistency; 30% rounded gravel and cobbles;
common very fine, fine, medium and coarse roots; neutral
(pH 7.0); diffuse wavy boundary.
- C1 25-63 cm Grayish brown (2.5Y 5/2) sandy clay loam; weak, fine
(10-25 in.) subangular blocky breaking to weak fine granular
structure; friable, sticky, plastic consistency; 40%
rounded gravel and cobbles; few coarse and medium roots;
neutral (pH 7.0); diffuse boundary
- C2 63-84 cm Dark gray (5Y 4/1) clay loam; weak, fine subangular
(25-33 in.) blocky structure; friable, sticky, plastic consistency;
50% gravel and cobbles; few medium and fine roots; mildly
alkaline (pH 7.5); diffuse boundary
- C3 84-180 cm Dark gray (5Y 4/1) clay loam; moderate, fine subangular
(33-71 in.) blocky structure; firm, sticky, plastic consistency; 50%
rounded gravel and cobbles; moderately alkaline (pH 8.0)

Sample Location: About 100 yards up the west slope from the road at the north boundary of Tom Williams' patented claim on Resurrection Creek on the Kenai Peninsula.

Range in Characteristics:

- O Horizon Thickness: 5-20 cm (2-8 in.)
- A Horizon Color: Hue 10YR, Value 3, Chroma 2
Thickness: 20-25 cm (8-20 in.)
Texture: Sandy loam
Coarse Fragments: 25-35% gravel and cobbles
Remarks: Not always present

Soil Number: 64--Continued

C Horizon Color: Hue 2.5-5Y, Value 4-5, Chroma 1-2
 Thickness: Up to 155 cm (61 in.)
 Texture: Sandy clay loam to clay loam
 Coarse Fragments: 40-50% gravel and cobbles
 Remarks: Loses cohesive properties when wet

CHENA SERIES

Soil Map Unit: Ch

Soil Classification: Typic Cryorthents, sandy-skeletal, mixed

Summary Description: These soils are deep, well drained, and form in alluvial sands and gravels. They are located on outwash plains. The slopes range from 0 to 8%. The mean annual temperature is about 37 F. The mean annual precipitation is about 60 in.

Sample Pedon Description:

- | | | |
|----|------------------------|---|
| Oi | 5-0 cm
(2-0 in.) | Dark reddish brown (5YR 3/2) partially decomposed twigs and moss; very strongly acid; abrupt smooth boundary. |
| C1 | 0-127 cm
(0-50 in.) | Brown (7.5YR 3/2), very gravelly sandy; single grain; loose; common roots; 50% gravel; medium acid. |

Sample Location: Sample profile located about 750 feet south of northeast corner, Section 8, T8N, R3E.

Range in Characteristics:

None available

Commonly have a mantle of loamy tidal sediments up to 25 cm thick.

CLUNIE SERIES

Soil Map Unit: C1

Soil Classification: Terric Borofibrists, loamy, mixed, euic

Summary Description: These soils are deep, very poorly drained, and are formed in non-acid peat from decomposed sedges and bushes over fine textured tidal sediments. They are located in broad depressions on low lying tidal plains. The slopes range from 0 to 8%. The mean annual temperature is about 37 F. The mean annual precipitation is about 60 in.

Sample Pedon Description:

- Oi1 0-71 cm Dark, yellowish brown (10YR 4/4, broken face) to light
 (0-28 in.) olive brown (2.5Y 5/4, rubbed and pressed) moss peat with
 admixture of sedge peat; moderate coarse platy structure;
 many fine roots; 2% mineral material; very strongly acid;
 gradual wavy boundary.
- Oi2 71-96 cm Dark, yellowish brown (10YR 4/4, broken face) to light
 (28-38 in.) olive brown (2.5Y 5/4, rubbed and pressed) moss peat with
 admixture of sedge peat; moderate coarse platy structure;
 2% mineral material; medium acid; gradual wavy boundary.
- C1 96-126 cm Gray (N 5/) very fine sandy loam; nonsticky, nonplastic
 (38-50 in.) consistency; medium acid.

Sample Location: About 6 miles south of Knik in the Matanuska Valley area,
 Alaska on coordinates SW1/4 NW1/4, Section 17, T15N, R3W.

Range in Characteristics:

- O Horizon Color: Hue 10YR, Value 4, Chroma 4
 Thickness: 84-122 cm (27-48 in.)
 PH: medium acid to neutral
 Remarks: Peat is commonly mixed with silt
- C Horizon Color: Hue N5-5GB, Value 4, Chroma 1
 Texture: silty clay loam to very fine sandy loam

CRYAQUENTS

Soil Map Unit: Cn

Soil Classification: Cryaquents

Summary Description: These soils are deep, poorly to very poorly drained, and are formed in alluvial tidal sediments. They are located at the coastal margin that is inundated periodically by the tides. The slope ranges from 0 to 8%. The mean annual temperature is about 37 F. The mean annual precipitation is about 60 in.

Sample Pedon Description:

- | | | |
|----|--------------------------|--|
| 01 | 2.5-0 cm
(1-0 in.) | Partially decomposed sedge peat; abrupt smooth boundary. |
| A1 | 0-8 cm
(0-3 in.) | Dark, grayish brown (10YR 4/2) very fine sandy loam; weak, fine granular structure; friable, nonsticky, nonplastic; comon fine and medium roots; neutral; abrupt smooth boundary. |
| C1 | 8-30 cm
(3-12 in.) | Dark gray (N 4/) very fine sandy loam; common medium prominent dark yellowish brown (10YR 4/4) mottles; massive; friable; nonsticky, nonplastic consistency; few roots; neutral; clear smooth boundary. |
| C2 | 30-150 cm
(12-60 in.) | Dark gray (N 4/) very fine sandy loam; massive; friable, nonsticky, nonplastic consistency; neutral. |

Sample Location: Located about 1500' south and 500' W of NE corner, Section 1, T8W, R3E.

Range in Characteristics:

No other descriptions to develop a range.

Gr SERIES

Soil Map Unit: Gr

Soil Classification: Gr peat

Summary Description: These soils are deep, very poorly drained, and develop in decomposed sphagnum moss, sedges, and willow. They are located in broad depressions between tidal plains and the mountains. The slope ranges from 0 to 8%. The mean annual temperature is about 37 F. The mean annual precipitation is about 60 in.

Sample Pedon Description:

- | | |
|------------------------------|---|
| 0i1 0-10 cm
(0-4 in.) | Dark brown (7.5YR 4/4, broken face; 10YR 4/3, rubbed and pressed) moss peat; moderate coarse platy structure; many roots; less than 5% mineral material; medium acid; abrupt smooth boundary. |
| 0i2 10-18 cm
(4-7 in.) | Gray (5/ broken face; 5Y 5/1, rubbed and pressed) moss peat; moderate coarse platy structure; many roots; 5 to 10% mineral material; medium acid; abrupt smooth boundary. |
| 0i3 18-41 cm
(7-16 in.) | Olive brown (2.5Y 4/4, broken face) to light olive brown (2.5Y 5/4, rubbed and pressed) moss peat; moderate coarse platy structure; many roots; less than 5% mineral material; medium acid; abrupt smooth boundary. |
| 0i4 41-162 cm
(16-64 in.) | Gray (N 5/ broken face; 5Y 5/1, rubbed and pressed) moss peat; moderate coarse platy structure; few roots; 5 to 10% mineral material; medium acid. |

Sample Location: The sample profile is located at the center of Section 6, T8N, R3E. in the Portage Area.

Range in Characteristics:

Insufficient data.

NIKLASON SERIES

Soil Map Unit: Nk

Soil Classification: Typic Cryofluvents, coarse-loamy over sandy, mixed, nonacid

Summary Description: These soils are deep, well drained, and form in stratified alluvial sediments. They are located on alluvial fans and stream terraces. The slopes range from 0 to 8%. The mean annual temperature is about 37 F. The mean annual precipitation is about 60 in.

Sample Pedon Description:

- | | | |
|----|--------------------------|--|
| Ap | 0-20 cm
(0-8 in.) | Dark, grayish brown (10YR 4/2) sandy loam; weak fine granular structure; friable, nonsticky, nonplastic consistency; many fine and medium roots; very strongly acid; clear smooth boundary. |
| C1 | 20-91 cm
(8-36 in.) | Dark gray (10YR 4/2) loamy fine sand; single grained; very friable, nonsticky, nonplastic consistency; common fine and medium roots; discontinuous sandy loam strata; very strongly acid; gradual wavy boundary. |
| C2 | 91-102 cm
(36-40 in.) | Dark gray (10YR 4/1) very gravelly, loamy sand; single grain; loose. |

Sample Location: Sample profile is located about 600' south and 700' east of NW corner, Section 9, T8N, R3E.

Range of Characteristics:

The fine sediments range from 10-40 inches over the gravelly substratum.

STAVE SERIES

Soil Map Unit: St

Soil Classification: Typic Cryorthents, sandy, mixed, nonacid

Summary Description: These soils are deep, well drained, and form in sandy alluvium. They are located on flood plains. The slope ranges from 0 to 8%. The mean annual temperature is about 37 F. The mean annual precipitation is about 60 in.

Sample Pedon Description:

- | | | |
|----|---------------------------|---|
| 01 | 2.5-0 cm
(1-0 in.) | Partially decomposed grass. |
| A1 | 0-8 cm
(0-3 in.) | Dark, grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, nonsticky, nonplastic consistency; many roots; very strongly acid; abrupt smooth boundary. |
| C1 | 8-41 cm
(3-16 in.) | Very dark gray (N 3/) loamy sand; common medium distinct brown (10YR 4/3) mottles; single grain; loose; many roots; strongly acid; abrupt smooth boundary. |
| C2 | 41-127 cm
(16-50 in.) | Very dark gray (N 3/) gravelly sand; 1 single grain; loose; slightly acid. |
| C3 | 127-152 cm
(50-60 in.) | Very dark gray (N 3/) gravelly sand; single grain; loose; slightly acid. |

Sample Location: Sample profile located 1750' west and 700' north of SE corner Section 32, T9N, R3E.

Range in Characteristics:

Insufficient data.

APPENDIX B

These tables identify commonly used soil properties and make the data available for easy access by the user. These interpretations are made for the upper five feet of the soil. The interpretations are intended to be used in the planning phase for project developments. More site specific data may be necessary and should be collected as necessary for the design and implementation of each project.

ESTIMATED PHYSICAL AND ENGINEERING PROPERTIES OF SOILS

SOIL NUMBER

The soil number refers to a specific soil represented by a profile description found in Appendix A. All the estimated physical properties and engineering interpretations in this table refer to this specific profile.

MAP UNIT

The map unit(s) listed are those in which the identified soil has been mapped either as the major soil or as a part of a complex of two or more soils. The physical properties and engineering interpretations are made for each soil as it occurs in the identified map unit(s).

MOST LIKELY DEPTH TO BEDROCK

The most likely depth to bedrock is an estimate of the minimum depth or range in depth of the soil based on numerous observations of the soil depth in the field. In most cases when the depth indicated as "greater than 40 or 60", bedrock was not found to be shallower than those depths.

AASHTO

The American Association of State Highway and Transportation Officials Classification system classifies the soil according to those properties that affect road construction and maintenance. Normally there are contrasting layers of soil in the upper five to six feet. This estimate attempts to cover the range of the index properties for the major layers (10 inches or greater in thickness) within each soil or the average of the major layers.

UNIFIED

The Unified Soil Classification system classifies the soils according to the properties that affect their use as construction materials. Normally there are contrasting layers of soil in the upper five to six feet. This estimate attempts to cover that range of the index properties for the major layers (10 inches or greater in thickness) within each soil or the average of the major layers.

USDA TEXTURE

The United States Department of Agriculture Classification system classifies the soil according to their textural properties for a complete spectrum of activities and uses. Normally there are contrasting layers of soil in the upper five to six feet. This estimate attempts to cover that range of the index properties for the major layers (10 inches or greater in thickness) within each soil or the average of the major layers.

SOIL WETNESS

These classes are intended to describe the wetness (depth and persistence of free water) of the soil during that period when the soil is not frozen which is also somewhat synonymous with the growing season.

The classes of depth to the wet state:

Class 1: Not wet above a depth of 150 cm.

Class 2: Wet in some part above a depth of 150 cm but not above a depth of 100 cm.

Class 3: Wet in some part above a depth of 100 cm but not above a depth of 50 cm.

Class 4: Wet in some part above a depth of 50 cm but not above a depth of 25 cm.

Class 5: Wet above a depth of 25 cm.

The classes of duration of the wet state:

Class a: Wet less than one-twelfth of the time.

Class b: Wet one-twelfth to one-fourth of the time.

Class c: Wet one-fourth to one-half of the time.

Class d: Wet more than one-half of the time.

SOIL PH

The numerical measure of acidity is expressed as pH. With this notation, pH 7 is neutral. Lower values indicate greater acidity; higher values, greater alkalinity. Soils in this survey range in pH from a little less than 4.0 to about 7.0. The best plant growth in this survey area is generally in the pH range of 5.5 to 7.0.

The pH values shown in the table indicate a range for the soil. The first pH is for the upper 10 inches and the second pH is for the lower subsoil to 60 inches. One pH value represents the entire soil profile.

SOIL DRAINAGE

Soil drainage was originally developed to express a general relationship between the amount of soil aeration and the soils ability to handle water relative to the production of agricultural crops. It has also been commonly used to express the ability of the soil to drain water relative to numerous other management activities and is therefore included in this report.

Seven drainage classes are recognized. The first two, excessively drained and somewhat excessively drained, describe soils that are dry longer than is typical for the dominant soils of an area. Well drained soils are neither unusually dry nor unusually wet. Increasing degrees of wetness limit use in moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained soils.

The following definitions are purposely vague in order to provide the flexibility that is desirable for assigning drainage classes in a given area. The concept of the drainage class evolved in areas with a humid-temperate climate.

The seven classes are:

1. Excessively drained: Water is removed from the soil rapidly, and these soils are rarely ever saturated. Commonly, these soils are coarse-textured or shallow, stony, and/or occur on steep slopes.
2. Somewhat excessively drained: Water is removed rapidly from the soil and these soils are very seldom saturated except during the wet season in wet years.
3. Well drained: Water is removed from the soil readily and these soils are saturated only during the wet season for short periods.
4. Moderately well drained: The soil remains wet in some subhorizons for less than 90 days in any year.
5. Somewhat poorly drained: Water is removed so slowly that the soil remains wet for significant periods (90-180 days in any year) in some subhorizons. The water table is near the surface (6-12 inches) when the soil is wet.
6. Poorly drained: Water table is near the surface (3-6 inches). Water is removed so slowly that the whole soil is saturated for 180-270 days in any year.
7. Very poorly drained: These soils are wet to the surface most of the year (0-3 inches for more than 270 days). They are wet enough to prevent the growth of commercial tree species unless drained. All Histisols except the Folists and certain soils in the Terric subgroups are very poorly drained.

POTENTIAL FROST ACTION

Potential frost action is a relative estimate for the likelihood of upward or lateral movement of soil by the formation of segregated ice lenses resulting in frost heave and the subsequent loss of soil strength upon thawing. Classes are used in regions where frost action is a potential problem.

1. Low - Soils are rarely susceptible to the formation of ice lenses.
2. Moderate - Soils are susceptible to the formation of ice lenses, resulting in frost heave and subsequent loss of soil strength.
3. High - Soils are highly susceptible to the formation of ice lenses, resulting in frost heave and subsequent loss of soil strength.

APPENDIX B

ESTIMATED PHYSICAL AND ENGINEERING PROPERTIES OF THE SOILS

SOIL NUMBER	MAP UNIT GROUP	DEPTH TO BEDROCK (EST.)	AASHTO (EST.)	UNIFIED (EST.)	USDA TEXTURE (EST.)	SOIL WETNESS	SOIL PH RANGE	SOIL DRAINAGE	POTENTIAL FROST ACTION
24	101	>40"	A2-A4	ML/GM	vgrsl	1a	4.8-6.0	Well Drained	Moderate
	105								
	205								
48	101	<20"	A4	ML	vgrl	4a	-	Moderately Well Drained	Moderate
	102								
51	103	>40"	A6-A7	ML	sil/grsicl	3b	5.2-5.5	Moderately Well Drained	Moderate
15	104	>60"	A1	GM/GP	egrs1-egls	1a	4.5-6.5	Well Drained	Moderate/Low
14	105	>40"	A1	SM/GP	vgrsl/egrs	1a	5.5-6.0	Well Drained	Moderate/Low
25	201	<20"	A1	GM	vgrsl	4a	<4.5	Well Drained	Moderate
34	202	>60"	A1	GM/ML/GP	v-egrl	1a	4.6-6.2	Well Drained	Moderate
29	204	20-40"	A4	ML	vgrsl	4d	4.6-6.0	Poorly Drained	High
	205								
61	204	>40"	A4	ML	sicl-1	3d	5.4-5.8	Somewhat Poorly Drained	High
	306								
20	207	20-40"	A2	ML-GP	grl/vgrsl	3d	6.4-6.8	Somewhat Poorly Drained	Moderate
63	205	20-40"	A1	GM/GP	vgr/egrs1	3a	5.4-5.8	Well Drained	Moderate
	206								
	208								
62	211	>60"	A4	ML/GM	sil/vgrsil	2a	5.3-6.0	Well Drained	Moderate
16	301	>60"	A1	GM	vgrls	4d	7.2-7.8	Poorly Drained	Moderate
19	302	>60"	A1	SM/GP	cosl/egres	1a	5.4-5.8	Somewhat Excess Drained	Moderate/Low
50	303	>60"	A1	SM/GP	lfs/egres	3d	7.5-7.8	Somewhat Poorly Drained	High/Moderate
7	304	>60"	A2-A4	ML/GM	sl/vgrsl	2b	4.6-6.2	Well Drained	Moderate
	305	Soils similar to Map Unit 304 but disturbed by placer mine activities.							Low
64	306	>60"	A2-A6	SM/GC	vgsl/vgrcl	5b	7.0-8.0	Poorly Drained	High
36	401	>60"	-	PT/GC	org/egrcl	5d	3.8-5.8	Very Poorly Drained	High
	402	>60"	A4-A6	ML	fsl	5d	-	Very Poorly Drained	High
Chena Series	Ch	>60"	A1	SP	vgrs	1a	5.6-6.0	Somewhat Excess Drained	Low
Clunie Series	C1	>60"	A4	PT/ML	org/vfsl	5d	4.5-6.0	Very Poorly Drained	High
-	Cn	>60"	A4	ML	vfsl	4d	6.6-7.3	Poorly Drained	High
-	Gr	>60"	-	PT	Peat	5d	5.6-6.0	Very Poorly Drained	High
Nikla-son Series	Nk	>60"	A2-A4	SM	lfs/vgrls	2a	4.5-5.0	Well Drained	Moderate/High
Stave Series	St	>60"	A1	SM/SW	ls/grs	3a	4.5-6.5	Well Drained	Moderate

APPENDIX C

INTERPRETATION TABLES

SOIL INTERPRETATIONS FOR CONSTRUCTION MATERIALS (Table 1.)

These tables are provided so the user may determine which map units have the highest potential for roadfill, sand and gravel. Remarks are made for each interpretation in each map unit that indicates the type of limitation or the extent of the source. These interpretations are based on the properties exhibited by the representative soil(s) in the map unit.

ROAD FILL

Road fill consists of soil material that is excavated from its original position and used for road construction elsewhere. Soils are evaluated as to the amount of material available for excavation, the ease of excavation, and how well the material performs in place as roadfill after excavation. Soil properties that affect the amount of material available for excavation are thickness of suitable material above bedrock. Properties that affect the ease of excavation are the percent of coarse fragments larger than 3 inches and depth to high water table,

PROBABLE SAND SOURCES

Suitable sand as a construction material is defined as particle ranging from .074 mm (sieve #200) to 4.76 mm (sieve #4) in diameter. The soil-site factors important in evaluating the soils as a probable source for sand are: grain size, thickness of the sand layer, and the amount of rock fragments in the soil material. Sand sources are layers at least 91 cm (36 in) thick that have less than 50 percent rock fragments larger than 7.6 cm (3 in) in diameter.

PROBABLE GRAVEL SOURCES

Gravel as a construction material is defined as the size of particles ranging from 4.76 mm (sieve #4) to 76 mm (3 in) in diameter. The soil-site factors used to evaluate the soil as a probable source for gravel are grain size, the thickness of the gravel layer, and the amount of rock fragments larger than three inches contained in the soil material. Gravel sources are layers at least 91 cm (36 in) thick that have less than 50 percent coarse fragments larger than 7.6 cm (3 in) in diameter.

TABLE 1

SOIL INTERPRETATIONS FOR CONSTRUCTION MATERIALS

MAP				CONSTRUCTION MATERIALS			
UNIT SOIL		ROAD FILL		SAND		GRAVEL	
GROUP	NO.	RATING	REMARKS	RATING	REMARKS	RATING	REMARKS
101	24	Fair	May only be 30-60" thick, bedrock is sometimes <60" deep. May be <50% gravel in places.	Improbable	Layer <36" thick.	Probable	Layer may be <36" thick, may be <50% gravel in places.
102	48	Poor	Soil is <20" to bedrock.	Improbable	Layer <20" thick.	Improbable	Layer is <20" thick.
	24	Fair	May only be 30-60" thick, bedrock is sometimes <60" deep. May be <50% gravel in places.	Improbable	Layer <36" thick.	Probable	Layer may be <36" thick, may be <50% gravel in places.
103	51	Poor	Low bearing strength.	Improbable	Insufficient sand.	Improbable	Insufficient gravel.
104	15	Good		Improbable	Insufficient sand.	Probable	
105	14	Good		Probable	Thickness not verified.	Probable	Thickness not verified.
	24	Fair	May only be 30-60" thick, bedrock is sometimes <60" deep. May be <50% gravel in places.	Improbable	Layer <36" thick.	Probable	Layer may be <36" thick, may be <50% gravel in places.
201	25	Poor	Soil is <20" to bedrock.	Improbable	Layer <20" thick.	Improbable	Layer <20" to bedrock.
	63	Poor	Layer <36" thick. Layer may be <40" to bedrock.	Improbable	Layer <36" thick.	Probable	Layer >36" thick (not verified).
202		Fair	25-50% cobbles >3" diameter.	Probable	25-50% cobbles >3" diameter.	Probable	25-50% cobbles >3" diameter. Thickness >60" (not verified).
204	29 & 61	Poor	Layer <30" thick. High water table.	Improbable	Layer <36" thick. Insufficient sand. High water table.	Improbable	Insufficient gravel. High water table.
205	63	Poor	Layer <36" thick. Layer may be <40" to bedrock.	Improbable	Layer <36" thick.	Probable	Layer >36" thick (not verified).
	24	Fair	May only be 30-60" thick, bedrock is sometimes <60" deep. May be <50% gravel in places.	Improbable	Layer <36" thick.	Probable	Layer may be <36" thick, may be <50% gravel in places.
	29	Poor	Layer <30" thick. High water table.	Improbable	Layer <36" thick. Insufficient sand. High water table.	Improbable	Insufficient gravel. High water table.
206	63	Poor	Layer <36" thick. Layer may be <40" to bedrock.	Improbable	Layer <36" thick.	Probable	Layer >36" thick (not verified).
	64	Poor	High water table. High clay content.	Improbable	High clay content.	Improbable	High clay content.
207	28	Poor	Layer <36" thick (not verified).	Improbable	Layer <36" thick (not verified). Insufficient sand.	Improbable	Layer <36" thick (not verified).

MAP			CONSTRUCTION MATERIALS				
UNIT SOIL		ROAD FILL		SAND		GRAVEL	
GROUP	NO.	RATING	REMARKS	RATING	REMARKS	RATING	REMARKS
208	63	Poor	Layer <36" thick. Layer may be <40" to bedrock.	Improbable	Layer <36" thick. Insufficient sand.	Probable	Layer >36" thick (not verified).
211	62	Fair	Layer 30-60" thick. Patches of ice.	Improbable	Excess fines. Patches of ice.	Improbable	Layer <36" thick. Patches of ice.
301	16	Poor	High water table. Thickness >36" (not verified).	Probable	High gravel content. Thickness >36" (not verified).	Probable	High water table. Thickness >36" (not verified).
302	19	Fair	Layer 30-60" thick.	Probable	Thickness >36" (not verified).	Probable	Thickness >36" (not verified).
303	50	Poor	High water table.	Improbable	High water table. Potentially thin layer.	Improbable	High water table. Potentially thin layer.
304	7	Fair	Thickness >36" (not verified).	Improbable	Layers stratified and thin. Periodic high water table.	Probable	Thickness >36" (not verified). Periodic high water table.
305		The same soils as in Map Unit 304 but disturbed by placer minning.					
306	64	Poor	High water table. High clay content.	Improbable	High clay content.	Improbable	High clay content.
401	36	Poor	High water table. Thick organic surface. High shrink-swell.	Improbable	Thick organic surface. Insufficient sand. High water table.	Improbable	Thickness <36" (not verified). Thick organic surface.
402	-	Poor	High water table.	Improbable	High water table. Insufficient sand.	Improbable	High water table. Insufficient gravel.
GP	-	Good		Improbable	Insufficient sand.	Probable	
RW	-	Poor	High water table and flood frequency.	Probable	High water table and flood frequency.	Probable	High water table and flood frequency.
Ch	-	Good		Probable		Improbable	Insufficient gravel.
Cl	-	Poor	High water table. Thick organic surface.	Improbable	Insufficient sand.	Improbable	Insufficient gravel.
Cn	-	Poor	High water table.	Improbable	Fine soil texture.	Improbable	Fine soil texture.
Gr	-	Poor	High water table.	Improbable	Thick organic soil.	Improbable	Thick organic soil.
Nk	-	Good		Probable		Improbable	Insufficient gravel.
St	-	Good		Probable		Improbable	Insufficient gravel.

INTERPRETATIONS FOR LAND CAPABILITY AND NATURAL HAZARDS (Table 2.).

FLOOD CLASSES

Flooding is the temporary covering of soil surface by flowing water from any source, such as streams overflowing their banks, runoff from adjacent or surrounding slopes, inflow from high tides, or any combination of sources. Shallow water standing or flowing during or shortly after rain or snowmelt is excluded from the definition of flooding. Standing water (ponding) or water that forms a permanent covering is excluded from the definition.

Flooding class estimates are based on interpretation of soil properties and other evidence gathered during the soil survey field work. Flooding hazard is expressed by frequency classes, duration classes, and time of year flooding occurs. Not considered here, but nevertheless important, are velocity and depth of floodwater. Frequencies used to define classes are generally estimated from evidence related to the soil and vegetation and are expressed in wide ranges that do not indicate a high degree of accuracy.

Frequency Classes:

None: No reasonable possibility of flooding (near 0 percent chance of flooding in any year).

Rare: Flooding unlikely but possible under unusual weather conditions (0 to 5 percent chance of flooding in any year, or near 0 to 5 times in 100 years).

Occasional: Flooding is expected infrequently under usual weather conditions (5 to 50 percent chance of flooding in any year, or 5 to 50 times in 100 years).

Frequent: Flooding is likely to occur often under usual weather conditions (more than a 50 percent chance of flooding in any year, or more than 50 times in 100 years).

SLOPE CATEGORIES

Each map unit number is followed by a letter which denotes the slope range that represents the major portion of that map unit. Map units that do not have a letter may be assumed to be the same as those with the letter "A". The categories are as follows:

A: 0-8%
B: 9-15%
C: 16-25%
D: 26-45%
E: 46-65%
F: 66-100%

MASS WASTING

Mass wasting is the inherent potential for large masses of earth material to be moved by gravity either slowly or quickly from one place to another. The events may occur naturally or they may be accelerated or stimulated by a management activity. The following ratings have been applied to the various map units to provide the land manager with a relative scale for the potential for mass wasting. These ratings have been developed using a matrix which applies a numerical weight to the various soil, geological and climatological properties or other events that affect mass wasting. The manager should note that the ratings are developed for an undisturbed map unit and that any land disturbing activity may increase the potential for mass wasting. Land managers who are planning activities in map units which have a high mass wasting rating should contact a soil scientist for more direction for the suitability of the land for that management activity.

Classes:

Very High: Soils rated in this hazard class have the highest probability of failure. Generally these are units with slopes greater than 65%, or on slopes greater than 45% in soils derived from volcanic ash or lacustrine sediments. Additional factors contributing to instability of these areas are somewhat poorly and poorly drained soils, and areas with frequent, deep V-notches. Evidence of past failure are often present in these areas. Roading these areas is the greatest threat of management induced mass failures. The location of roads in this class of soil, therefore, should be avoided or minimized in the planning process. Detailed soil and geotechnical investigation should be made prior to any vegetation altering management activities. The investigation should be done to assess the impacts that a slide might have on site productivity, fisheries and wildlife habitat, and visual quality.

High: These areas have a high probability of failure even though they are thought to be more stable than the areas in the very high class. Included are areas with slopes normally 45 to 65% in somewhat poorly and poorly drained soils. Where management activities cannot be avoided in these areas, site specific soil and geotechnical investigation are necessary to determine the probability of failure, and the likely effect of a failure on other resource values.

Moderate: These areas are generally stable in an undisturbed condition unless an extreme precipitation event occurs. Any natural disturbance or management practice that adversely changes the complex soil shear strength, shear stress relationship can result in slope failures. These areas rarely have visible indications of instability. Most well drained soils on slopes 45-65% are included in these areas. Somewhat poorly and poorly drained soils on slopes 25-45% are also included. These areas can be safely managed without a high risk of landslides by application of management practices designed to

maintain the shear strength of soil and roots, and avoid increasing the effective weight of the soil mass. Management practices should be designed to avoid interrupting the natural surface and subsurface drainage patterns and minimize disturbance to the soil surface.

Low: These areas have the least probability of landslides. Any slope failures that do occur are usually associated with incised stream channels or short steep escarpments. This class includes soils with slope gradients less than 25%. Short slope lengths caused by broken slopes with gradients 25-45% are also included in this class. These soils are normally not subject to mass wasting. Management practices designed to protect streambanks and V-notches, and prevent surface erosion are appropriate.

TIMBER PRODUCTIVITY

The index of timber productivity in this table is an estimated range and mean site index for White Spruce growing in even-age stands. Values are for base age 100 years (8). The tables were developed by matching the site indexes obtained from the forest stand exams on the Kenai Peninsula at Summit Lake, Kenai Lake, and Snow River with the over-lapping soil map units. The stand exams were performed with a slight bias toward the better growing trees in an attempt to provide a more realistic value for the productivity of the site. Exact locations of the site index plots could not be located relative to a specific soil within a map unit, so the timber productivity is expressed for the map unit group.

LIMITATIONS TO LOW USE ROADS

Limitations to low use roads is an estimate of the in-place soil to be used for the construction of low use roads with no other surface that will support traffic such as that common in small scale mining and logging activities. These ratings have been developed using physical properties of the soil that influence the bearing strength and durability of the road surface, such as the soil texture, depth to bedrock, water table, soil wetness, etc. The remarks section is included to highlight the major soil properties which provide the greatest limitations for the soil to support vehicle traffic.

Ratings:

Slight: There are not any major soil limitations for the construction of a low use road on the representative soil in this map unit.

Moderate: These are one or two soil limitations that must be overcome to construct a road that will be suitable for low use. These limitations are identified so the user is aware of them and can mitigate them with minimum cost.

Severe: There are one or more soil limitations that are serious enough to cause a significant increase in cost to provide a road suitable for use. Although these limitations can be overcome, if cost is a major concern, this road should be located where there are more suitable soils.

TABLE 2

INTERPRETATIONS FOR LAND CAPABILITY AND NATURAL HAZARDS

MAP UNIT GROUP	FLOOD POTENTIAL	MASS WASTING HAZARD		TIMBER PRODUCTIVITY SITE INDEX		LIMITATIONS FOR LOW USE ROADS	
		M.U.	RATING	MEAN	RANGE	RATING	REMARKS
101	None	A-C	Low	67	60 TO 75	Moderate	Fine surface texture
		D-F	Moderate				
102	None	B-C	Low	60	55 TO 65	Severe	Depth to bedrock is <20".
		C-F	Moderate				
103	None	A-B	Low	63	50 TO 60	Severe	Fine texture, some wetness.
		C	Moderate				
		D-E	High				
104	Rare	D	Moderate	-	-	Slight	
105	Rare	A-B	Low	55	50 TO 65	Slight	
		C-D	Low				
201	None	E-F	Moderate	-	-	Severe	Depth to bedrock is <20". Wet soils
202	Occasional	A-B	Low	62	55 TO 65	Moderate	25-50% cobbles >3" diameter.
		C	Low				
		D	Moderate				
		E-F	High				
204	None	A-B	Low	68	65 TO 80	Severe	High water table. Fine surface texture.
		C	Moderate				
205	Frequent	C	Moderate	67	60 TO 80		See Map Unit 204 for 20% of area See Map Unit 208 for 50% of area See Map Unit 101 for 30% of area
		D-E	Moderate				
		F	High				
206	None	D	Moderate/High	66	60 TO 80		See Map Unit 208 for 70% of area See Map Unit 204 for 30% of area
		E	High				
207	Rare	A-B	Low	65	60 TO 70	Moderate	Fine surface texture. Some wetness.
207	Rare	C	Moderate	65	60 TO 70	Moderate	Fine surface texture. Some wetness.
208	None	A-B	Low	67	65 TO 75	Slight	
		C-E	Moderate				
		F	High				
211	None	B	Low	-	-	-	
		C	Moderate	-	-	Moderate	Fine surface texture. Patches of ice.
301	Frequent	A-B	Low	-	-	-	
		C	Low	-	-	Severe	High water table.
302	Occasional	A-B	Low	66	60 TO 80	Slight	
		C-D	Low				
303	Frequent	A-B	Low	62	55 TO 75	Slight	
304	Occasional	A-B	Low	-	-	Slight	
305	Occasional	A-B	Low	-	-	Slight	
		C-D	Low	-	-		
306	None	D-E	High	65	60 TO 70	Severe	Wetness, high clay content.
401	None	A-B	Moderate	-	-	Severe	High water table. Thick organic surface.

MAP UNITS	FLOOD POTENTIAL	MASS WASTING HAZARD		TIMBER PRODUCTIVITY SITE INDEX		LIMITATIONS TO LOW USE ROADS	
		SLOPE	RATING	MEAN	RANGE	RATING	REMARKS
402	Frequent	A	Low	-	-	Severe	High water table.
GP	Rare	A	Low	-	-	Slight	Fine texture soils.
RW	Frequent	A	Low	-	-	Severe	Wetness and floods.
Ch	Occasional	A	Low	-	-	Severe	Insufficient fines.
Cl	Occasional	A	Low	-	-	Severe	Thick organic surface.
Cn	Frequent	A	Low	-	-	Severe	Fine texture subsoil.
Gr	Occasional	A	Low	-	-	Severe	Fine soil texture.
Nk	Occasional	A	Low	-	-	Slight	Thick organic soil.
St	Rare	A	Low	-	-	Moderate	Soft soils. lack of sufficient fines to bond soil.

* Site Index data for the Timber Productivity section comes from the 1978 Timber Inventory, the Forest Stand Exam , and the Soil Site Index plots of 1977 and 1978.

RECREATIONAL AND DEVELOPMENTAL LIMITATIONS (Table 3.)

These tables are provided so the user may determine which map units have the highest potential for a variety of recreational and developmental activities. The major limitations that need to be considered are identified for each map unit.

SLOPE CATEGORIES

Each map unit number is followed by a letter which denotes the slope range that represents the major portion of that map unit. Map units that do not have a letter may be assumed to be the same as those with the letter "A". The categories are as follows:

- A: 0-8%
- B: 9-15%
- C: 16-25%
- D: 26-45%
- E: 46-65%
- F: 66-100%

CAMP AREAS

Camp areas are tracts of land used intensively as sites for tents, trailers, campers, and the accompanying activities of outdoor living. Camp areas require such site preparation as shaping and leveling in areas for tents and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The soils are rated on the basis of soil properties that influence the ease of developing camping areas and the performance of the camping area after development.

PICNIC AREAS

Picnic areas are natural or landscaped tracts used primarily for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking lots. Soils are rated on the basis of properties that influence development costs of shaping the site, trafficability, and growth of vegetation after development.

TRAILS

Paths and trails are used for walking, horseback riding, and similar uses. The soils are rated on the properties that limit trafficability and erosion. These are stoniness, wetness, texture of the surface layer, slope, flooding, erodibility, and, in dry regions, dustiness.

SHALLOW EXCAVATIONS

Shallow excavations are trenches or holes dug in the soil to a maximum depth of 5 or 6 feet. They are used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, gravesites, and the like. The excavations are most commonly made by trenching machines or backhoes. The ratings are based on the soil properties that influence ease of digging and resistance to sloughing.

EXCAVATED PONDS

An aquifer-fed excavated pond is a body of water created by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. The soil properties that affect aquifer-fed ponds are depth to a permanent water table and permeability of the aquifer. Large stones are also considered because of the effect on the ease of excavation.

TABLE 3

RECREATIONAL AND DEVELOPMENTAL LIMITATIONS

MAP UNITS	CAMPGROUNDS & SLOPE RANGE		PICNIC AREAS RATING REMARKS		TRAILS RATING REMARKS		SHALLOW EXCAVATIONS RATING REMARKS		EXCAVATED PONDS RATING REMARKS	
101	A	Slight			Moderate	Fine surface soils.	Slight		Severe	No water. Slow refill.
	B	Moderate	Slopes 9-15%.		Moderate	Fine surface soils.	Moderate	Slopes 9-15%	-	-
	C-D	Severe	Slopes >15%.		Moderate	Slopes 16-45%.	Severe	Slopes >15%.	-	-
	E-F	-	-		Severe	Slopes >45%.	Severe	Slopes >45%.	-	-
102	B	Severe	Bedrock <20".		Moderate	Fine surface soils.	Severe	Bedrock <20".	Severe	Bedrock <20".
	C-D	Severe	Slopes >15%.		Moderate	Slopes 16-45%.	Severe	Slopes >15%.	-	-
	E-F	Severe	Slopes >45%		Severe	Slopes >45%.	Severe	Slopes >45%.	-	-
103	A	Moderate	Silty soils.		Moderate	Fine surface soils.	Slight	-	Severe	Slow refill.
	B	Moderate	Slopes 9-15%.		Moderate	Fine surface soils.	Moderate	Slopes 9-15%.	Severe	Steep slopes.
	C-D	Severe	Slopes 16-45%.		Moderate	Slopes 16-45%.	Severe	Slopes >15%. Bedrock est. 40-60" deep.	-	-
	E	Severe	Slopes >45%.		Severe	Slopes >45%. Bedrock est. 40-60" deep.	Severe	Slopes >45%. Bedrock est. 40-60" deep.	-	-
104	D	Severe	Slopes 26-45%.		Moderate	Slopes 26-45%. Stones >3" diameter.	Severe	Slopes 26-45%. Cutbanks cave.	Severe	No water. Short steep slopes.
105	A	Slight	-		Slight	-	Severe	Cutbanks cave.	Severe	No water.
	B	Moderate	Slopes 9-15%.		Slight	-	Severe	Slopes 9-15%.	Severe	Steep slopes.
	C-D	Moderate	Slopes >15%. Small stones.		Moderate	Slopes >15%. Small stones.	Severe	Slopes >15%.	-	-
201	E-F	Severe	Slopes >45%. Bedrock <20".		Severe	Slopes >45%. Bedrock <20".	Severe	Slopes >45%. Bedrock <20".	-	-
202	A	Moderate	Occasional flooding.		Slight	-	Severe	Cutbanks cave. small stones.	Severe	>5' to water.
	B	Moderate	Slopes 9-15%.		Slight	-	Severe	Slopes 9-15%.	Severe	Steep slopes.
	C-D	Severe	Slopes >15%.		Moderate	Slopes 16-45%. silty layers.	Severe	Slopes >15%.	-	-
	E-F	Severe	Slopes >45%.		Severe	Slopes >45%.	Severe	Slopes >45%.	-	-
204	A	Moderate	Wet soil. Slow permeability.		Moderate	Depth to water 1-2'.	Severe	Water above 3'. Bedrock est <40".	Slight	Must fill from runoff water.
	B	Moderate	Slopes 9-15%.		Moderate	Depth to water 1-2'.	Severe	Slopes 9-15%.	Severe	Steep slopes.
	C	Severe	Slopes >15%.		Moderate	Slopes >15%.	Severe	Slopes >15%.	-	-
205	C-D	Severe	Slopes >15%. Some wet soils.		Moderate	Slopes 16-45%. Depth to water 1-2' in some soils.	Severe	Slopes >15%.	Severe	Steep slopes.
	E-F	Severe	Slopes >45%. Some wet soils.		Severe	Slopes >45%.	Severe	Slopes >45%.	-	-
206	D	Severe	Slopes >25%. Some wet soils.		Moderate	Slopes 26-45%. Depth to water 1-2' in some soils.	Severe	Slopes >25%.	Severe	Steep slopes.
	E	Severe	Slopes >45%. Some wet soils.		Severe	Slopes >45%.	Severe	Slopes >45%.	-	-

CAMPGROUNDS &									
MAP	SLOPE	PICNIC AREAS	TRAILS		SHALLOW EXCAVATIONS		EXCAVATED PONDS		
UNITS	RANGE	RATING	REMARKS	RATING	REMARKS	RATING	REMARKS	RATING	REMARKS
207	A	Slight	-	Slight	-	Moderate	Bedrock est. 20-40".	Slight	-
	B	Moderate	Slopes 9-15%.	Slight	-	Moderate	Slopes 9-15%.	Severe	Steep slopes
	C	Severe	Slopes >15%.	Moderate	Slopes 16-25%.	Severe	Slopes >15%.	-	-
208	A	Slight	-	Slight		Slight		Severe	>5' to water.
	B	Moderate	Slopes 9-15%.	Slight	-	Moderate	Slopes 9-15%	Severe	Steep slopes.
	C-D	Severe	Slopes >15%.	Moderate	Slopes 16-45%.	Severe	Slopes >15%.	-	-
	E-F	Severe	Slopes >45%.	Severe	Slopes >45%. Compact till.	Severe	Slopes >45%.	-	-
211	B	Moderate	Slopes 9-15%, patches of permafrost.	Slight	-	Moderate	Slopes 9-15%, patches of permafrost.	Severe	Steep slopes.
	C	Severe	Slopes >15%.	Moderate	Slopes >15%.	Severe	Slopes >15%.	-	-
301	A	Severe	Frequent floods, water table <1'.	Severe	Frequent floods, water table <1'.	Severe	Water table <1'.	Slight	Cutbanks cave.
	B	Severe	Slopes 9-15%.	Severe	Frequent floods, water table <1'.		Slopes 9-15%	Severe	Steep Slopes.
302	A	Moderate	Occasional floods, sandy soils.	Slight	-	Severe	Cutbanks cave. Occasional floods.	Severe	>5' to water.
	B	Moderate	Slopes 9-15%.	Slight	-	Severe	Slopes 9-15%.	Severe	Steep slopes.
	C-D	Severe	Slopes >15%.	Moderate	Slopes 16-45%.	Severe	Slopes >15%.	-	-
303	A	Severe	Frequent floods, water table <2'.	Moderate	Frequent floods.	Severe	Frequent floods, water table <2'.	Slight	Cutbanks cave.
	B	Severe	Slopes 9-15%.	Moderate	Frequent floods.	Severe	Slopes 9-15%.	Severe	Steep slopes.
304	A	Moderate	Occasional floods.	Slight	-	Moderate	Occasional floods.	Slight	>5' to water.
	B	Moderate	Slopes 9-15%.	-	-	Moderate	Slopes 9-15%.	Severe	Steep slopes.
305	A	Moderate	Occasional floods. Cutbank cave.	Moderate	Small stones.	Moderate	Cutbanks cave. Occasional floods	Severe	>5' to water.
	B	Moderate	Occasional floods, slopes 9-15%. cutbanks cave.	Moderate	Small stones.	Moderate	Occasional floods, small stones, cutbanks cave, slopes 9-15%.	Severe	Steep slopes. >5' to water.
	C-D	Severe	Slopes >15%.	Moderate	Slopes 16-45%.	Severe	Slopes >15%.	-	-
306	D	Severe	Slopes >25%. High water table.	Moderate	Slopes 26-45%. Water table <2'.	Severe	Slopes >25%. high water table.	Severe	Steep slopes.
	E	Severe	Slopes >45%. High water table.	Severe	Slopes >45%.	Severe	Slopes >45%. high water table.	-	-
401	A	Severe	Water table <1'. Severe Organic soil.	Severe	Water table <1'. Severe Organic soil.	Severe	Water table <1'. organic soil.	Moderate	Must fill from runoff water
	B	Severe	Slopes 9-15%.	Severe	Water table <1'. Severe Organic soil.	Severe	Slopes 9-15%.	Severe	Steep slopes.

MAP UNITS	SLOPE RANGE	CAMPGROUNDS & PICNIC AREAS		TRAILS		SHALLOW EXCAVATIONS		EXCAVATED PONDS	
		RATING	REMARKS	RATING	REMARKS	RATING	REMARKS	RATING	REMARKS
402	A	Severe	Floods twice daily.	Severe	Floods twice daily.	Severe	Floods twice daily.	-	-
Ch	A	Moderate	Occasional floods.	Slight	Occasional floods.	Moderate	Occasional floods, cutbanks cave.	Moderate	Cutbanks cave.
C1	A	Severe	Organic soil. Occasional floods. Water table <1'.	Severe	Water table <1'. Organic soils.	Severe	Organic soils. Water table <1'.	Moderate	Must fill from runoff water.
Cn	A	Severe	Frequent floods. Water table <1'	Severe	Frequent floods. Water table <1'	Severe	Frequent floods. Water table <1'.	Slight	-
Gr	A	Severe	Organic soil. Water table <1' Occasional floods.	Severe	Organic soil. Water table <1'. Occasional floods.	Severe	Organic soil. Water table <1'. Occasional floods.	Slight	-
Nk	A	Moderate	Occasional floods.	Slight	Occasional floods.	Moderate	Occasional floods.	Moderate	>5' to water.
St	A	Severe	Wet soils, some flood areas.	Slight	Occasional floods.	Severe	High water table.	Slight	-

(1) USDA National Soils Handbook, July 1983 pp. 603-679.

APPENDIX D

APPROXIMATE ACREAGES FOR MAP UNIT GROUPS

<u>Map Unit Groups</u>	<u>Acreage</u>
101	30,220
102	3,936
103	1,208
104	323
105	524
201	281
202	2,562
204	1,019
205	5,452
206	1,746
207	1,442
208	5,935
211	91
301	235
302	2,534
303	2,771
304	912
305	171
306	446
401	1,079
402	146
GP	300
Ch	140
Cl	1,460
Cn	3,160
Gr	1,320
Nk	230
St	290
	69,935 acres

APPENDIX E
IDENTIFICATION LEGEND

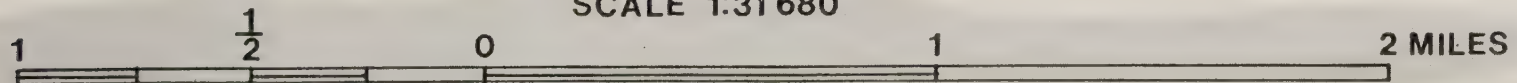
Map Unit Group	Map Unit Symbol	Map Unit Name
101	101A	Typic Cryorthods, medial-skeletal, mixed, 0-8% slopes
	101B	Typic Cryorthods, medial-skeletal, mixed, 9-15% slopes
	101C	Typic Cryorthods, medial-skeletal, mixed, 16-25% slopes
	101D	Typic Cryorthods, medial-skeletal, mixed, 26-45% slopes
	101E	Typic Cryorthods, medial-skeletal, mixed, 46-65% slopes
	101F	Typic Cryorthods, medial-skeletal, mixed, 66-100% slopes
102	102B	Lithic Cryorthods, loamy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 9-15% slopes
	102C	Lithic Cryorthods, loamy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 15-25% slopes
	102D	Lithic Cryorthods, loamy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 26-45%
	102E	Lithic Cryorthods, loamy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 46-65%
	102F	Lithic Cryorthods, loamy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 66-100%
103	103A	Typic Cryorthods, coarse-loamy, mixed, 0-8% slopes
	103B	Typic Cryorthods, coarse-loamy, mixed, 9-15% slopes
	103C	Typic Cryorthods, coarse-loamy, mixed, 16-25% slopes
	103D	Typic Cryorthods, coarse-loamy, mixed, 26-45% slopes
	103E	Typic Cryorthods, coarse-loamy, mixed, 46-65% slopes
	103F	Typic Cryorthods, coarse-loamy, mixed, 66-100% slopes
	104A	Typic Cryorthods, sandy-skeletal, mixed, 0-8% slopes
105	105A	Typic Cryorthods, sandy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 0-8% slopes
	105B	Typic Cryorthods, sandy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 9-15% slopes
	105C	Typic Cryorthods, sandy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 16-25% slopes
	105D	Typic Cryorthods, sandy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 26-45% slopes
201	201E	Lithic Cryorthods, loamy-skeletal, mixed - Dystric Cryochrepts, loamy-skeletal, mixed, complex, 46-65% slopes
	201F	Lithic Cryorthods, loamy-skeletal, mixed - Dystric Cryochrepts, loamy-skeletal, mixed, complex, 66-100% slopes
202	202A	Dystric Cryochrepts, loamy-skeletal, mixed, 0-8% slopes
	202B	Dystric Cryochrepts, loamy-skeletal, mixed, 9-15% slopes
	202C	Dystric Cryochrepts, loamy-skeletal, mixed, 16-25% slopes
	202D	Dystric Cryochrepts, loamy-skeletal, mixed, 26-45% slopes
	202E	Dystric Cryochrepts, loamy-skeletal, mixed, 46-65% slopes
	202F	Dystric Cryochrepts, loamy-skeletal, mixed, 66-100% slopes

Map Unit Group	Map Unit Symbol	Taxonomic Name
204	204A	Histic Cryaquepts, loamy-skeletal, mixed - Histic Cryaquepts, coarse-silty, mixed, complex, 0-8% slopes
	204B	Histic Cryaquepts, loamy-skeletal, mixed - Histic Cryaquepts, coarse-silty, mixed, complex, 9-15% slopes
	204C	Histic Cryaquepts, loamy-skeletal, mixed - Histic Cryaquepts, coarse-silty, mixed, complex, 16-25% slopes
205	205C	Dystic Cryochrepts, loamy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 16-25% slopes
	205D	Dystic Cryochrepts, loamy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 26-45% slopes
	205E	Dystic Cryochrepts, loamy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 46-65% slopes
	205F	Dystic Cryochrepts, loamy-skeletal, mixed - Typic Cryorthods, loamy-skeletal, mixed, complex, 66-100% slopes
206	206D	Dystic Cryochrepts, loamy-skeletal, mixed - Typic Cryaquents, loamy-skeletal, mixed, complex, 26-45% slopes
	206E	Dystic Cryochrepts, loamy-skeletal, mixed - Typic Cryaquents, loamy-skeletal, mixed, complex, 46-65% slopes
	206F	Dystic Cryochrepts, loamy-skeletal, mixed - Typic Cryaquents, loamy-skeletal, mixed, complex, 66-100% slopes
207	207A	Typic Cryumbrepts, loamy-skeletal, mixed, 0-8% slopes
	207B	Typic Cryumbrepts, loamy-skeletal, mixed, 9-15% slopes
	207C	Typic Cryumbrepts, loamy-skeletal, mixed, 16-25% slopes
	207D	Typic Cryumbrepts, loamy-skeletal, mixed, 26-45% slopes
208	208A	Dystic Cryochrepts, loamy-skeletal, mixed, 0-8% slopes
	208B	Dystic Cryochrepts, loamy-skeletal, mixed, 9-15% slopes
	208C	Dystic Cryochrepts, loamy-skeletal, mixed, 16-25% slopes
	208D	Dystic Cryochrepts, loamy-skeletal, mixed, 26-45% slopes
	208E	Dystic Cryochrepts, loamy-skeletal, mixed, 46-65% slopes
	208F	Dystic Cryochrepts, loamy-skeletal, mixed, 66-100% slopes
211	211B	Pergelic Cryochrepts, loamy-skeletal, mixed, 9-15% slopes
	211C	Pergelic Cryochrepts, loamy-skeletal, mixed, 16-25% slopes
301	301A	Typic Cryaquents, sandy-skeletal, mixed, 0-8% slopes
	301B	Typic Cryaquents, sandy-skeletal, mixed, 9-15% slopes
302	302A	Typic Cryorthents, sandy-skeletal, mixed, 0-8% slopes
	302B	Typic Cryorthents, sandy-skeletal, mixed, 9-15% slopes
	302C	Typic Cryorthents, sandy-skeletal, mixed, 16-25% slopes
303	303A	Typic Cryaquents, coarse-loamy over sandy-skeletal, mixed, 0-8% slopes
	303B	Typic Cryaquents, coarse-loamy over sandy-skeletal, mixed, 9-15% slopes

Map Unit Group	Map Unit Symbol	Taxonomic Name	
304	304A	Typic Cryofluvents, loamy-skeletal, mixed, 0-8% slopes	
	304B	Typic Cryofluvents, loamy-skeletal, mixed, 9-15% slopes	
	305	Talus from placer mining	
306	306C	Typic Cryaquents, loamy-skeletal, mixed, nonacid, 16-25% slopes	
	306D	Typic Cryaquents, loamy-skeletal, mixed, nonacid, 26-45% slopes	
	306E	Typic Cryaquents, loamy-skeletal, mixed, nonacid, 46-65% slopes	
401	401A	Terric Borosaprists, loamy-skeletal, euic, 0-8% slopes	
	401B	Terric Borosaprists, loamy-skeletal, euic, 9-15% slopes	
	402A	Tidal Flats	0-8% slopes
GP	GP	Gravel Pits	
	Ch	Chena very gravelly sand,	0-3% slopes
	Cl	Clunie peat,	0-3% slopes
	Cn	Cryaquents, loamy	0-3% slopes
	Gr	Gr peat	0-3% slopes
	Nk	Niklason sandy loam	0-3% slopes
	St	Stave fine sandy loam	0-3% slopes



SCALE 1:31680

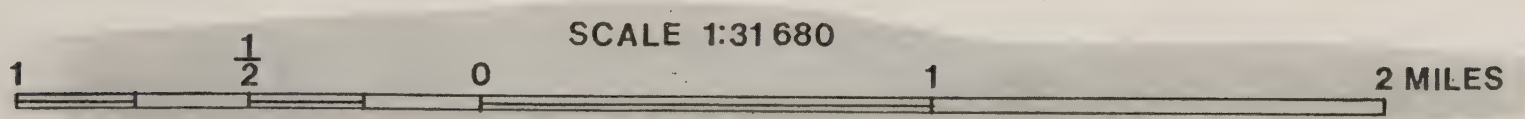


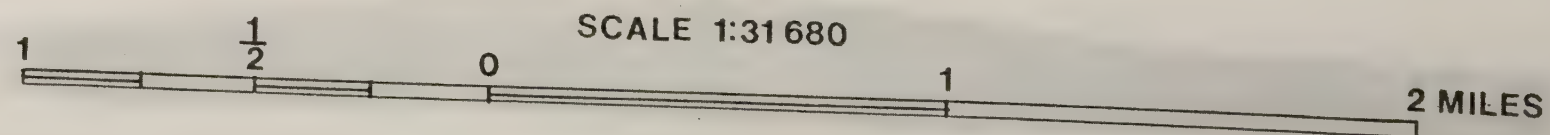
MAP 2



SCALE 1:31 680

2 MILES







MAP 6

MAP 4

Tincan Creek

SCALE 1:31 680

2 MILES

1

 $\frac{1}{2}$

O

1

MAP 6



SCALE 1:31 680

A graphic scale bar for a map at a scale of 1:31,680. The bar is labeled "SCALE 1:31 680" at the top. Below the scale, the bar is divided into four equal segments. The first segment is labeled "1", the second is labeled "1/2", the third is labeled "0", and the fourth is labeled "1". The total length of the bar is labeled "2 MILES" at the right end.



SCALE 1:31 680

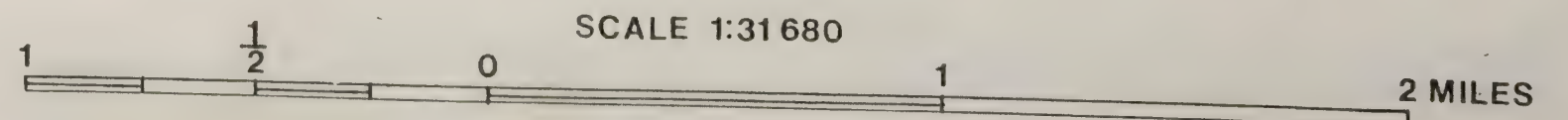
SCALE 1:31680

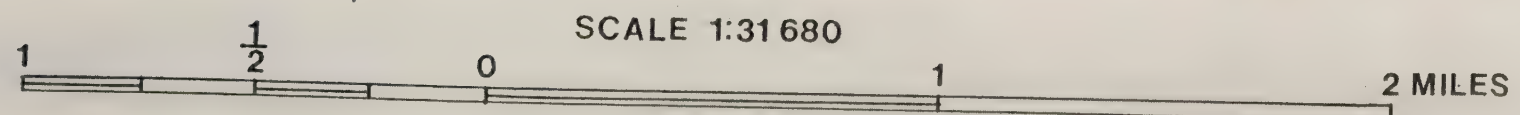
1 $\frac{1}{2}$ 0 1 2 MILES

A horizontal line representing a scale bar. Above the line, the text "SCALE 1:31680" is centered. Below the line, there are five tick marks. The first tick mark on the left is labeled "1". The second tick mark is labeled "1/2". The third tick mark is labeled "0". The fourth tick mark is labeled "1". The fifth tick mark on the right is labeled "2 MILES". The line itself is divided into four equal segments by these tick marks.

[illegible]

62727





2 MILES

MAP 13

MAP 10

Sunrise

N

SCALE 1:31 680

2 MILES



SCALE 1:31 680

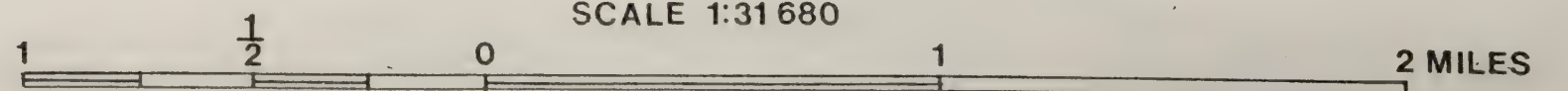
2 MILES

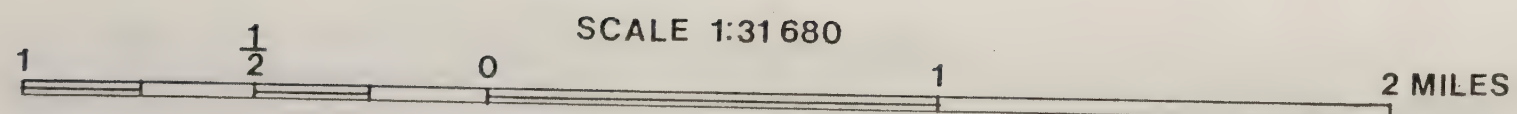
A

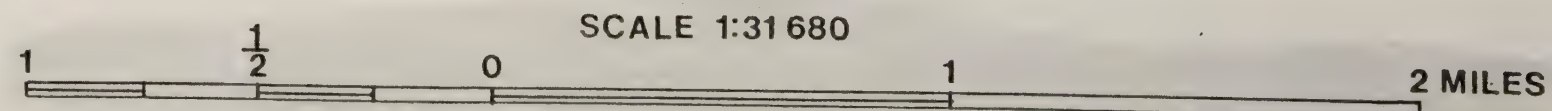
MAP 14



SCALE 1:31 680







2 MILES

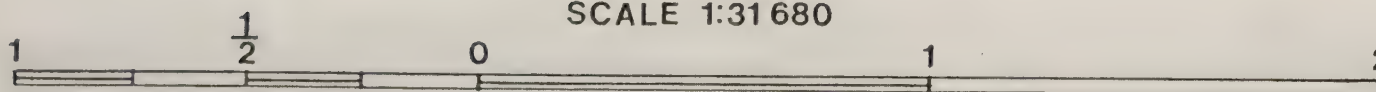


MAP 17

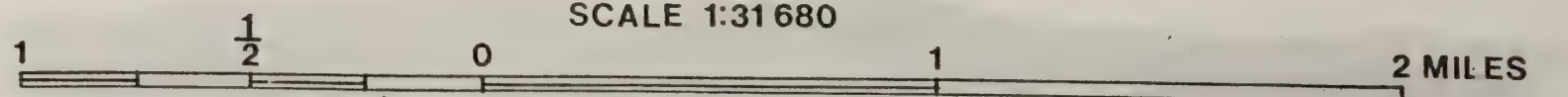
MAP 15

SCALE 1:31 680

2 MILES



SCALE 1:31 680





Cooper Lake

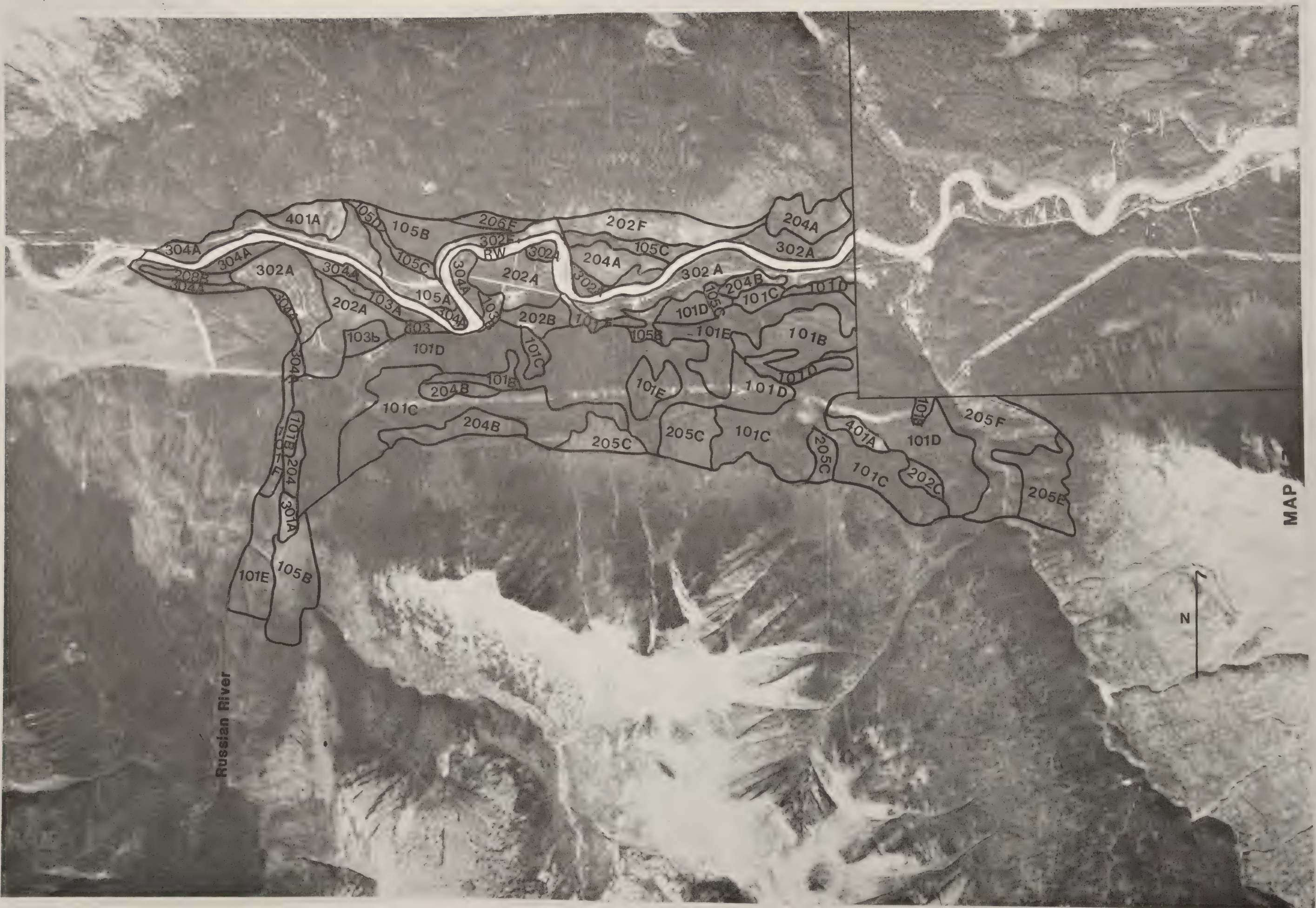
SCALE 1:31 680

SCALE 1:31 680

1 $\frac{1}{2}$ 0 1 2 MILES

A horizontal line with vertical tick marks at intervals. Above the line, the numbers 1, 1/2, 0, 1, and 2 are placed. The word 'MILES' is at the far right. The line is divided into four equal segments by the tick marks.

MAP 19



MAP

N

SCALE 1:31 680

2 MILES



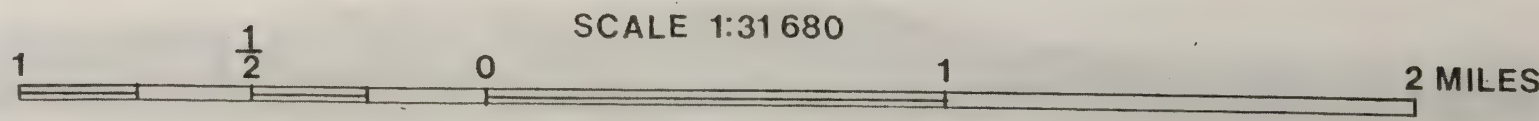
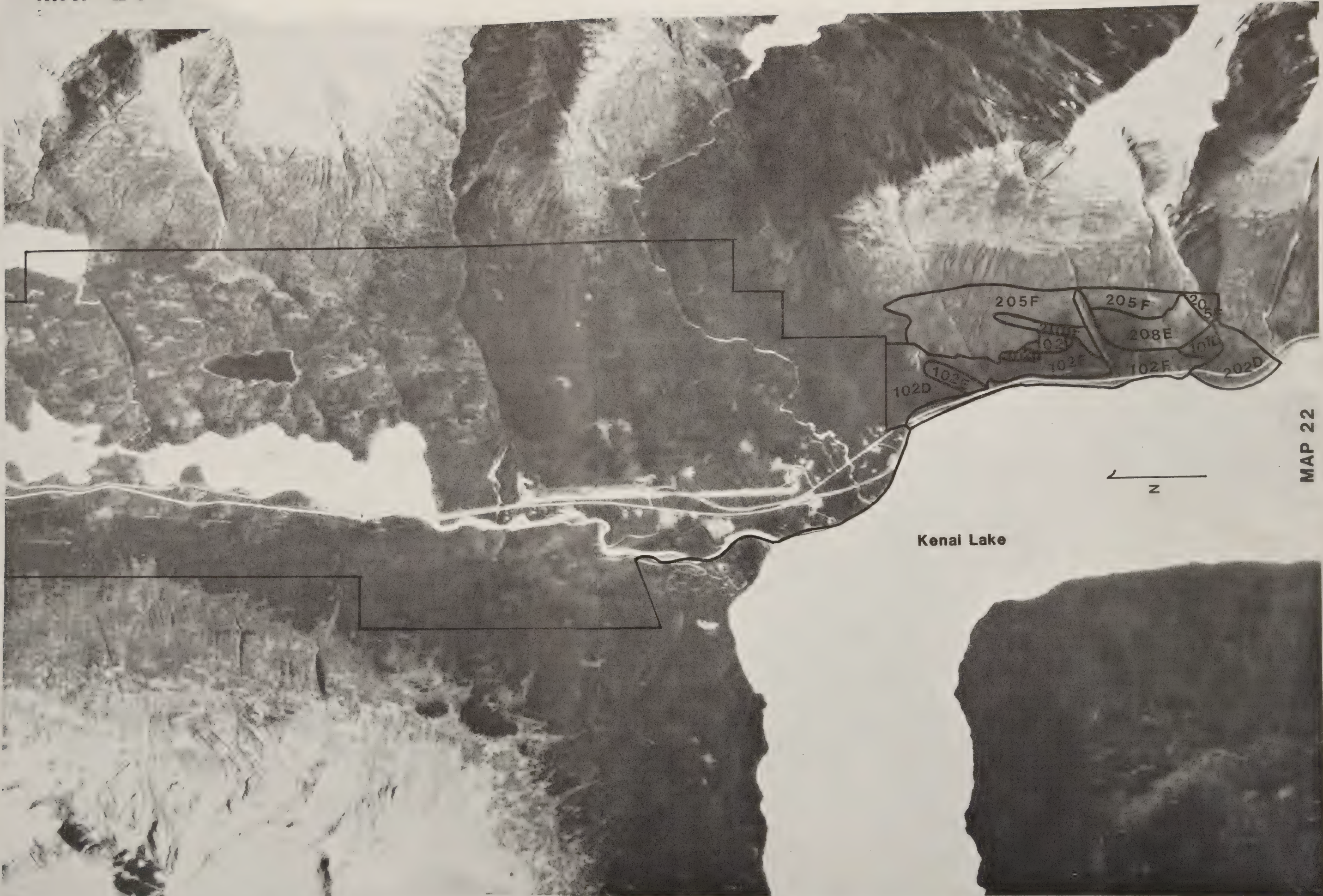
Trail Lake

N

SCALE 1:31680

2 MILES

MAP 16



MAP 23



2242

SCALE 1:31 680

SCALE 1:31 680

1 $\frac{1}{2}$ 0 1 2 MILES

A horizontal scale bar with tick marks at 1, 1/2, 0, 1, and 2 miles. The bar is divided into segments by these tick marks. The segment from 0 to 1 mile is further divided into four equal parts by smaller tick marks. The segment from 1 to 2 miles is also divided into four equal parts by smaller tick marks. The text 'SCALE 1:31 680' is centered above the bar.

